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FACTORY

MANAGEMENT AND MAINTENANCE

OCTOBER · 1952

How to pick people better
PAGE 134

New way to rate your key men
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308 methods improvements cost $3000—save $100,000
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Big step toward automatic assembly
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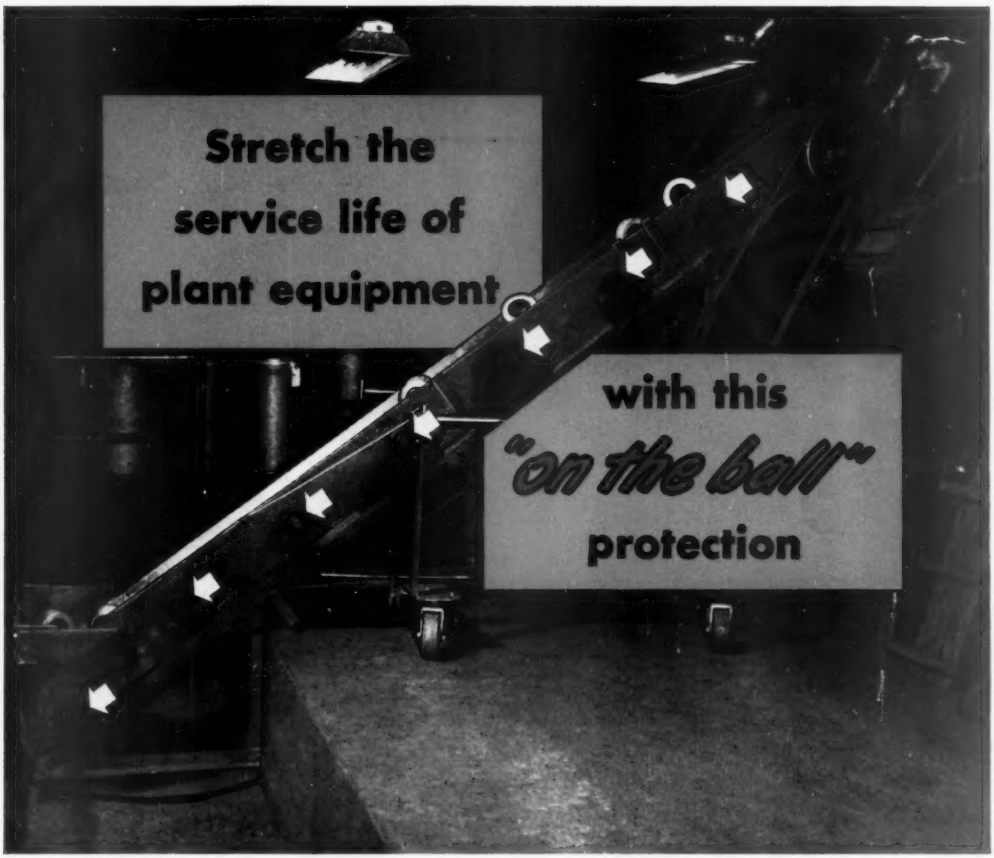


Operating conditions of the conveyor illustrated above could make life miserable for some maintenance man and cost man too. The building is unheated. Only about two hours' work a day is required. Materials being handled are heavy forgings direct from annealing and normalizing furnaces. These forgings are hot enough to burn through the conveyor belt in a few months. Thus the bearings of the conveyor are subjected to dirt, moisture condensation, extreme heat and cold. With it all, they've been operating for *over seven years* . . . requiring only infrequent lubrication.

The bearings on this conveyor are Fafnir SA 1-11/16" Pillow-Blocks . . . 16 of them. They're sealed to keep contaminants out . . . grease in. These "packaged" units feature the famous Fafnir Wide Inner Ring Bearing with self-locking collar . . . easiest of all to install.

Wherever there are turning points on your plant equipment . . . on line shafting, blowers, fans, pumps, special machines . . . Fafnir "on the ball" protection means extra long service life. For details, call your nearby Fafnir distributor. The Fafnir Bearing Company, New Britain, Conn.

PILLOW BLOCKS

. . . all types . . . light, standard, heavy . . . fixed and floating.

CARTRIDGES

. . . light and heavy series.

FLANGETTES

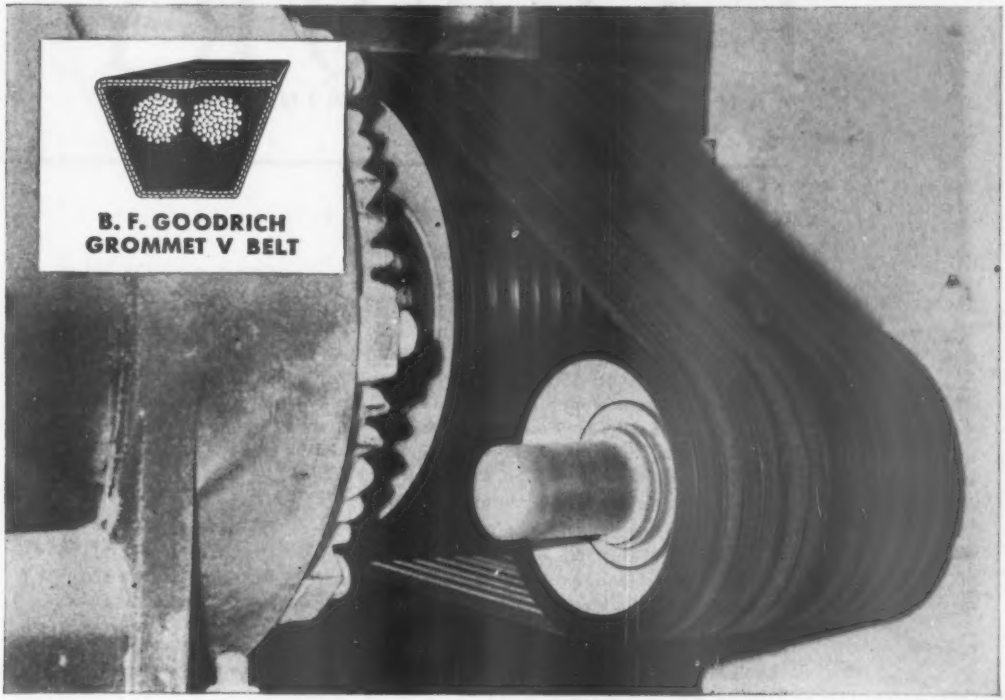
. . . with pressed steel flanges.

FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Where B.F.Goodrich grommet belts outlasted others 3 to 1

B.F.Goodrich grommet V belts cut costs 20 to 50%

ORDINARY belts, previously used on this drive, couldn't stand the heavy load, couldn't take the strain of 24-hour-a-day service. There were frequent shutdowns for repairs. Belts were averaging only 3 months' life. Then B.F.Goodrich grommet V belts were installed. When the picture was taken, the grommet belts had already outlasted ordinary belts 3 to 1, maintenance costs had been cut nearly 100%, and the belts still looked good for a lot more service. Here's why:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B.F.Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. There are no layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced. And grommet V belts stretch less — only ⅓ as much, on an average, as ordinary V belts.

Better grip, less slip — Grommet V belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

They cost no more — Grommet V belts cut costs because they last longer, increase production because machines keep running with fewer interruptions, reduce maintenance costs because they need less attention, yet they cost not one cent more. Available in C, D, and E sections. But remember, only B.F.Goodrich makes the grommet V belt (U. S. Patent No. 2,233,294), so to get all these savings, call in your local BFG distributor the next time you need V belts, or write *The B.F.Goodrich Company, Industrial & General Products Div., Akron, Ohio.* (Available in Canada)

Grommet V-Belts BY
B.F.Goodrich
FIRST IN RUBBER

FACTORY
MANAGEMENT AND MAINTENANCE

COMPLETE CONTENTS • OCTOBER 1952 • STARRED ITEMS

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THE MAGAZINE
OF PLANT MANAGEMENT
FOR 61 YEARS

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ARE HIGHLIGHTED HERE

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101 **PAYS BACK $100,000 IN 2½ YEARS.** There's the proof of the work simp pudding at Birtman Electric. Shows what can happen when you get supervisors all steamed up about better methods.

113 **DISGUSTED. THAT WAS PETE, THE TOOLROOM FOREMAN,** when mechanics plagued him with gripes about air tools. Too often he couldn't tell the legitimate gripers from the goldbricks. Now he's all smiles. Wallace Clark's chief staff engineer tells you why.

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COMING IN NOVEMBER

YOU, TOO, CAN BE A QUIZ KID. The two quizzes in "How to Rate Your Company and Yourself," coming next month, will show where you both stand—you as an employee, your company as an employer. So . . . fun and games in the offing, plus some pretty constructive ideas to help your company and mend your ways.

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Put a packaging "floor" under your product

Asphalt tile is tough, and durable—*once it's installed.* But until it is cemented to a solid surface, this popular building material is subject to breakage.

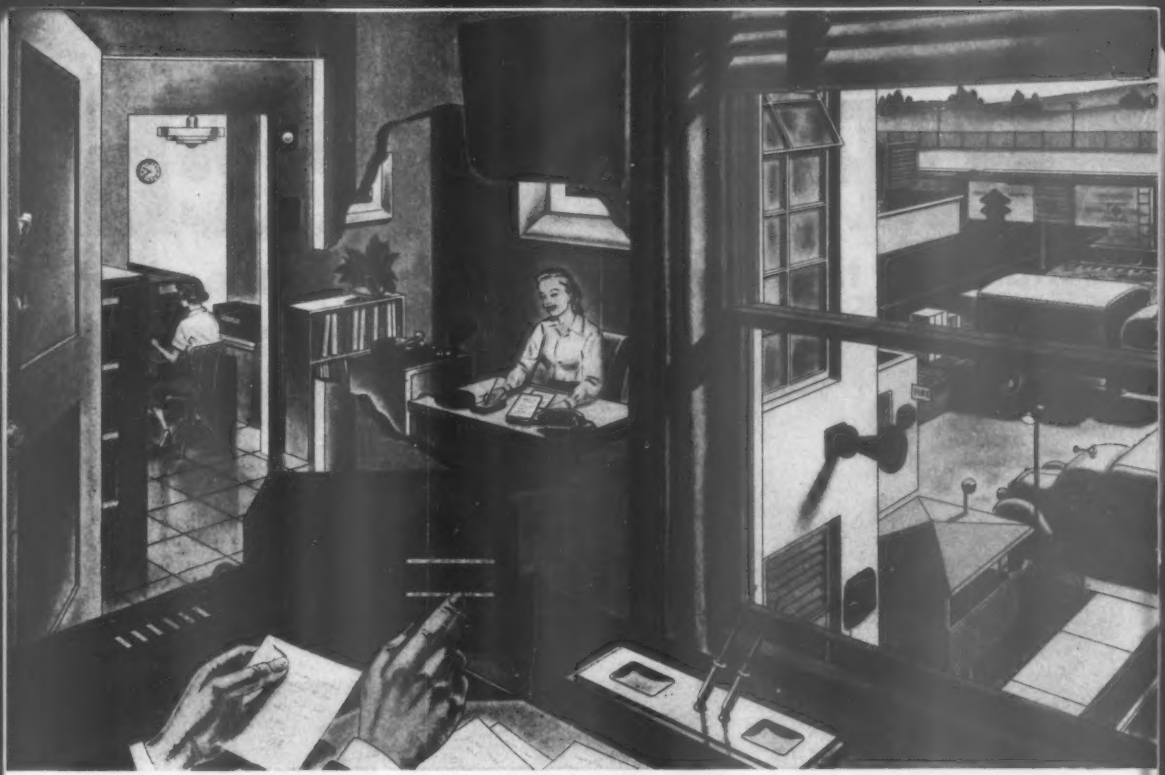
That's why **KENTILE** is shipped in a well-cushioned H & D double wall corrugated box. This extra strong, lightweight box provides extra *protection* to the product. Economically it lowers shipping charges and reduces breakage to an absolute minimum.

The H & D Package Laboratory is ready to engineer a better shipping box for your product . . . a box that will protect your product in transit and help to promote and merchandise it. Write for free booklet, "How To Pack It." Hinde & Dauch, 5207 Decatur Street, Sandusky, Ohio.

H&D

HINDE & DAUCH

Authority on Packaging



WHATEVER YOUR SIGNALING NEED — you can get the proper equipment from your local Graybar office. Edwards Lokator code-paging or calling systems . . . Altec electronic sound systems . . . Webster intercommunication systems . . . USI sound-powered telephones . . . *plus* fire alarm systems . . . bells, buzzers, horns, sirens, howlers — *all* are reliable products made by leading manufacturers. Check your nearby Graybar Representative for complete information on any item.

TALK, WARN, CALL, LOCATE — anywhere in your plant

FLICK-OF-A-SWITCH PAGING. An Edwards Lokator quickly locates personnel throughout your plant. Installations can be made using any type of signal equipment — horns, bells, buzzers, musical notes, or flashing lights.

Clear, fast plant-wide intercommunication speeds day-to-day operations . . . becomes absolutely vital during emergencies. But, before you buy communication equipment, check with Graybar to make sure you're getting the right choice of units for long-term service. Get the help of an experienced Graybar Signaling Specialist in planning the system best suited to your requirements — a system that will save steps, save time, save money . . . perhaps even lives.

Because Graybar distributes a complete line of signaling equipment, you or your electrical contractor can get all of your needs from a single convenient source. Your purchasing problem is simplified . . . you take full advantage of Graybar's nation-wide warehousing system . . . you can be sure of prompt, on-schedule deliveries.

In addition, Graybar distributes *everything electrical* for wiring, lighting, power, and ventilation—over 100,000 items in all. *Graybar Electric Co., Inc. Executive Offices: Graybar Building, New York 17, N. Y.*

162-1110

Call Graybar first for...

GraybaR Everything Electrical

IN OVER 100 PRINCIPAL CITIES

Order-assembly area at Johnson & Johnson, Chicago. Alternate order-picking aisles are reserved for one-way, two-lane TRUCK-TOW traffic. Fork-lift trucks use other aisles for replenishing stock. Trucks are switched automatically from two-lane traffic to single lane traffic at point A.

Link-Belt TRUCK-TOW helps cut order-assembly manhours 70%!

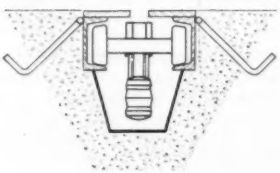
Johnson & Johnson sets new records for speed, safety, efficiency

BY LIMITING manual carrying of merchandise to less than three feet, eliminating confusing cross-traffic, Johnson & Johnson has achieved spectacular savings in its new Chicago shipping center. With the help of two parallel, integrated Link-Belt TRUCK-TOW Conveyors, they have actually *reduced manhours for order-picking by 70%* . . . for overall shipping operations by 35%.

Two parallel conveyor lines through order-picking aisles permit passing and practically double capacity. One line of trucks may be delegated for "slow" picking without hindering trucks on adjacent lane. Special towing masts permit automatic disengagement of truck to suit position of stock pickers. Hinged safety bumpers automatically disengage trucks when obstructed. Steel enclosures around track, trolleys and chain contribute to plant cleanliness.

Many other plants, warehouses and terminals report that TRUCK-TOW offers welcomed savings—not only for order-picking and shipping operations, but for receiving, department-to-department transport and in and out of storage. Whether you need a simple system or one tailored to suit special conditions . . . whenever packaged or bulky items are moved along a regular route, Link-Belt TRUCK-TOW Conveyors can slash your handling costs.

FLOOR TYPE TRUCK-TOW CONVEYOR OFFERS ADVANCED-DESIGN FEATURES

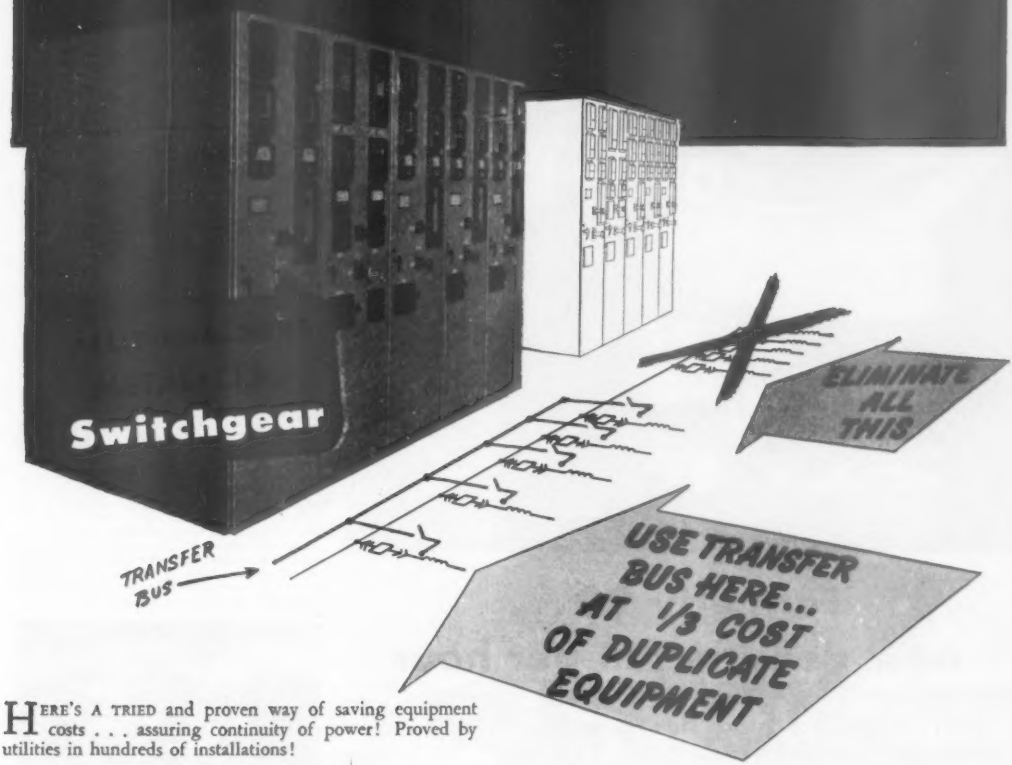


Especially popular where overhead structures interfere with fork-lift truck operation is the Floor-Type TRUCK-TOW. All moving parts are located below the floor.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,777

LINK-BELT
TRUCK-TOW CONVEYORS

Why Buy Duplicate Switchgear to Assure Power Continuity?



HERE'S A TRIED and proven way of saving equipment costs . . . assuring continuity of power! Proved by utilities in hundreds of installations!

What is a Transfer Bus?

It's simply a by-pass bus circuit that parallels the main switchgear bus. A switching means is provided so that loads can be transferred to the transfer bus. It's a standby in case anything happens to the main bus. Also, makes it possible to withdraw and maintain circuit breakers, or inspect main bus without power stoppage.

What are Other Advantages?

1. Saves Cost. Transfer bus costs about ⅓ as much as the additional equipment needed to provide duplicate switchgear to do this same job.
2. Cuts Space in Half. Allis-Chalmers supplies transfer bus in same cubicle as switchgear without adding cubicles. Thus an Allis-Chalmers installation cuts space one-half.

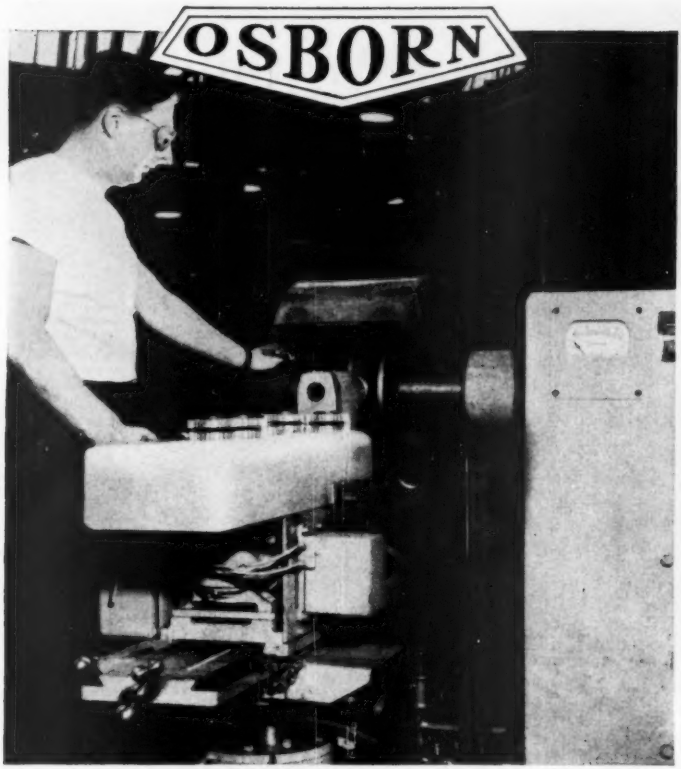
In addition, you can insure against failure of power source by providing a double end feed with the one set of switchgear and be as sure of power supply as if you had duplicate switchgear.

Depending on the job you want to do, there are many arrangements that Allis-Chalmers can provide. In many cases, the engineering has already been done.

Ask an Allis-Chalmers engineer about transfer bus arrangements and what they can mean to your plant in savings and service. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3731

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear



Formerly 20... now deburrs 125 per hour

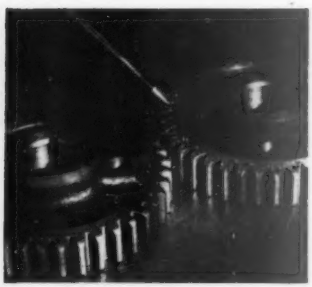
A new machine . . . the Osborn Work Holder Brushing Lathe . . . now deburrs gears and similar parts *at the push of a button!*

In the plant of Caterpillar Tractor Co., this automatic machine deburrs and finishes gear teeth *six times as fast* as the former hand method. Production now is 125 gears per hour. Output formerly was 20. Burrs and sharp edges are now removed uniformly. Every gear tooth has smooth, rounded edges and surfaces are blended.

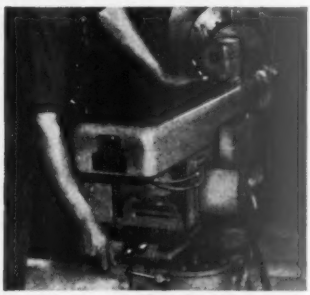
Find out how you can speed deburring and improve product quality with this versatile Osborn machine. Call your **O**sborn **B**rushing **A**nalyst today or write *The Osborn Manufacturing Company, Dept. 838, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

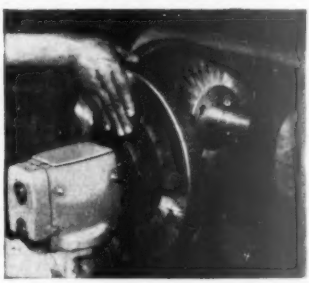
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear has smooth, uniform, rounded edges. Surfaces are blended. These gears were deburred on the machine shown at the left.



SET-UP IS SIMPLE. The machine is highly adaptable where production involves either large runs of a few parts or small runs of many different types and sizes of gears. Machine setups may be quickly made by unskilled operators. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.

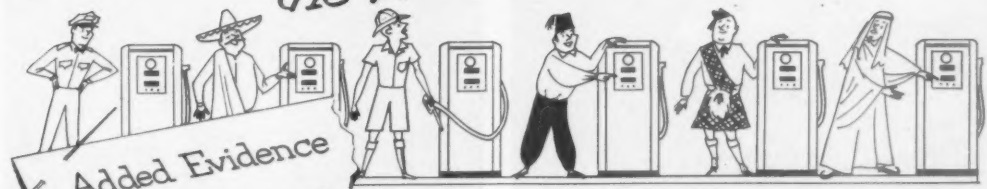


OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation. This machine deburrs 14-inch hypoid gears in 1½ minutes compared to 25 minutes for former method.

INVESTIGATE IT TODAY

for *your* problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

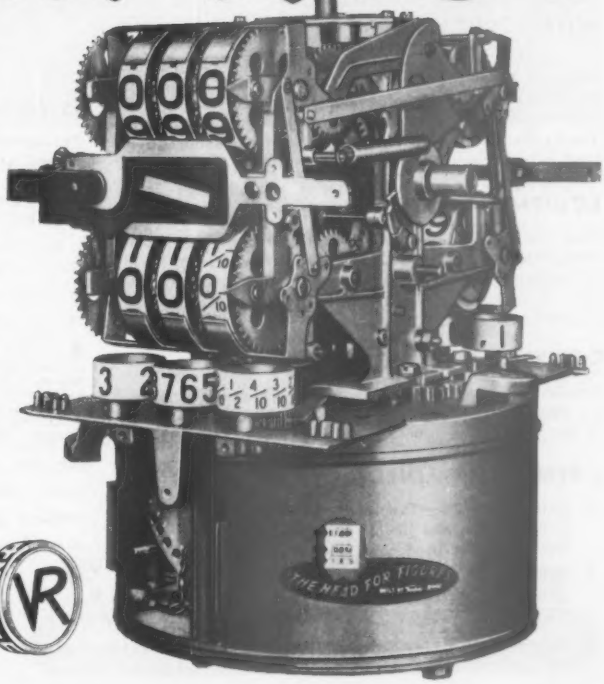
It Computes the Cost of Gasoline Pumped... in All of the World's Currencies



Added Evidence that—

Everyone Can Count on

VEEDER-ROOT



Yes, this Veeder-Root Gasoline Pump Computer speaks the languages of 144 countries! A rugged, accurate mechanism of 800-plus parts, it's the modern protection given you by gasoline pump manufacturers, gasoline refiners and their service-station outlets . . . *to make sure you get full measure in your tank, and the right change in your pocket* (or you can buy in "even money"). And what's more, it underscores the fact that "Veeder-Root Counts Everything on Earth" . . . electrically, mechanically or manually . . . with standard and special devices of every conceivable type. Do *you* have a counting problem, in any of your defense work or any of your regular production? If so, you can count on V-R to help you in every possible way.

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"The Name That Counts"
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Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"Counts Everything on Earth"

(Advertisement)

1. *A typical load picked up at mill chute by an Elwell-Parker F-15T Fork Truck being carried toward car dock.*

2. *Truck enters boxcar and special attachment starts to store load by pushing it forward.*

42 Men Do 60 Men's Work

To increase grain mill efficiency, Power Trucks operate round-the-clock . . . Over ¾ Million Pounds of bagged material handled daily . . . Unique attachment retrieves pallets.

WHAT TRUCKS DO

Trucks handle entire output of southern grain mill that processes 250,000 pounds of feed and 520,000 pounds of flour in 24 hours. All of this amount, in bags, comes down chute from mill to loading station where it is palletized. Trucks then carry loads directly into boxcars or high tier them in temporary storage.

EQUIPMENT USED

Fleet consists of 3 Elwell-Parkers. One truck was purchased about 3 years ago. Mill was so "well pleased" with its performance that two others have been added to take care of increased business and to replace other manual operations.

CONSTANT SERVICE

Trucks are busy 24 hours a day, five days a week. There are two batteries for each truck—one battery is in use on the truck at all times, while the other is "on charge".

3 BENEFITS GAINED

1. **Costs Cut 30%**—Trucks have enabled nearly one-third of the men doing handling operations to be freed for more productive work. **Saved $108 per day!**
2. ***Floor Space Saved***—In storage, trucks high tier loads to the ceiling, thus converting valuable floor space from square feet to cubic feet. Avoids extra building.
3. ***Pallets Retrieved***—When bags are placed in boxcar for shipment, special Elwell-Parker attachment pushes bags off, and withdraws pallet so that it can be used again. This system also increases usable space in car.

IS YOUR BAG HANDLING MECHANIZED?

This operation is a typical example that can be applied to the millions of bags in all industries shipped, handled, and rehandled each year. For further information, write The Elwell-Parker Electric Co., 4029 St. Clair Ave., Cleveland 3, Ohio.

3. *Still in boxcar, truck backs away and deposits load; note how retriever device withdraws pallet from beneath load.*

The Leslie Salt Co., Newark, California, produces 200,000 tons of salt annually by solar evaporation of sea water. Completely mechanized handling is a basic factor in the extremely low price of this essential commodity. For bulk handling outdoors at the gigantic salt piles, gasoline and diesel equipment is used. But storing or loading of the packaged salt in the plant is done exclusively by Elwell-Parker *electric* trucks. So knowledge of all motive powers leads J. C. Buchen, Leslie Vice President, to say further: "On an operating cost basis, we could not use gas trucks even if their first price were zero."

Leslie Salt's fleet of Elwell-Parkers operate by the world's cheapest power—electricity. There is no idling waste. Battery trucks also have fewer parts. This means less wear, lower maintenance, uninterrupted performance. E-P trucks operate quietly, without vibration, and are fume free. Also fully enclosed motors and controllers on Elwell-Parkers safeguard against corrosion in chemical-food plants.

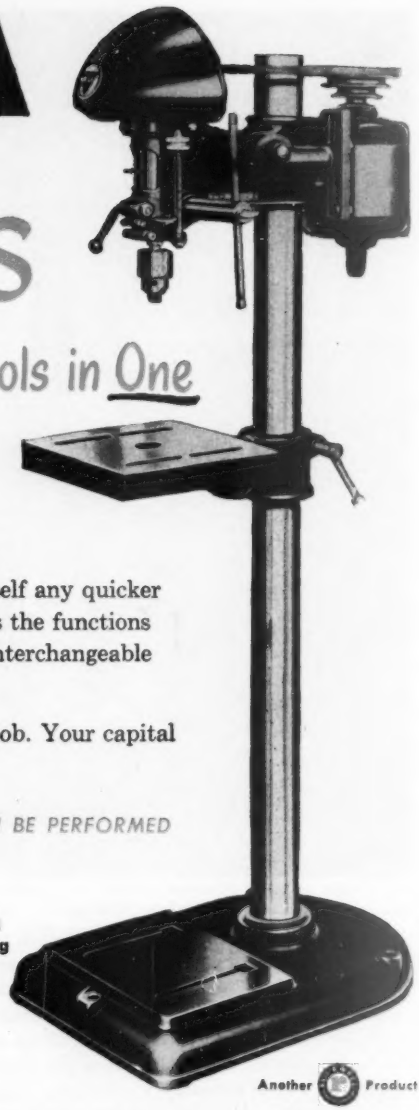
If you also want these plus values, get the full story on Elwell-Parker Electric trucks today. The Elwell-Parker Electric Co., 4029 St. Clair Ave., Cleveland 3, Ohio.

NEW General Catalog
describes all E-P trucks in detail. Write for your copy *NOW*.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

This DELTA 14-inch DRILL PRESS

is Scores of Maintenance Tools in One



Bring the tool to the job — or bring the job to the tool

No tool in your maintenance department pays for itself any quicker than a Delta drill press. This 14-inch model performs the functions of a number of machines. With the exclusive Delta interchangeable spindle, the cutting tool *can be changed in seconds!*

A Delta drill press can easily be moved from job to job. Your capital investment is small. Upkeep is almost negligible.

SOME OF THE MAINTENANCE OPERATIONS THAT CAN BE PERFORMED WITH THIS DELTA DRILL PRESS:

Drilling
Center Drilling
Core Drilling
Glass Drilling
Paper Drilling
Counter-boring
Counter-sinking
Surface Grinding
Dowel and Plug Cutting
Planing
Reaming
Milling
Spot Facing
Tapping
Polishing
Buffing
Mixing
Wheel Cutting
Arbor Pressing
Boring
Mortising
Routing
Carving
Sanding

Another Product

DELTA 14" DRILL PRESS

Available with either No. 1 Morse taper spindle or Jacobs Chuck that takes straight shank drills from No. 60 to full ½-inch. In high- or slow-speed models. Capacities up to ½-inch in cast iron. Quill has 4-inch stroke.

Also available—The DELTA 17" Drill Press

FOR HEAVY DUTY METAL WORKING AND STANDARD WOODWORKING MAINTENANCE OPERATIONS.

Available with either No. 2 Morse taper spindle or ½-inch Jacobs Chuck. In high- or slow-speed models. Capacities up to ¾-inch in cast iron. Quill has 5-inch stroke.

Send for the Delta AB-51 Catalog with full specifications covering all Delta Drill Presses.

There's a Delta Power Tool for Your Job-

WOOD OR METAL WORKING

53 Machines • 246 Models • More Than 1300 Accessories

Your Delta Dealer is listed in your Classified telephone directory under "Tools."

DELTA POWER TOOL DIVISION

DELTA MILWAUKEE **Rockwell** MANUFACTURING COMPANY

628L N. LEXINGTON AVE., PITTSBURGH 8, PA.

Announcing... NEW TRANSVEYOR!

Automatic's MANEUVERABLE AISLE-WORKING HIGH STACKER

EXPRESSLY DESIGNED for

- ★ **Greater Storage Space**
- ★ **Narrow Aisles**
- ★ **High Stacking**
- ★ **Maneuverability in Close Quarters**
- ★ **Limited Capacity Floors, Elevators**
- ★ **Economy and Long Life**

To answer industry's need for a compact, low-cost stacker for extreme close-quarter lifting, moving and stacking, Automatic now offers an entirely new riding-type electric truck—The Transveyor!

EXCLUSIVE FEATURES!

- Patented Balanced Action—No Frame Distortion
- Pivoted Steering Axle • Two Steering Wheels
- Two Equal Sized Tires • Equalized Load Distribution on Both Steering Wheels Regardless of Floor Condition
- Distribution of Weight Not Affected by Tire Wear
- Identical Ball Bearing Steering Turntables

In addition to the exclusive innovations, Transveyor also embodies these time-tested, service-proved AUTOMATIC features:

Dead-man control—Cold drawn Alloy steel uprights—Two-wire electrical system—no ground circuits—Controlled plugging—maximum operator visibility—Easy top or side removal of battery—maximum battery accessibility and protection.

Only
Transveyor has
Balanced Action!
Balanced Action Automatically Equalizes The Load on Both Wheels Regardless of Floor Conditions
THIS
NOT THIS
Uneven floor surfaces are compensated for by the exclusive center-pivoted feature. This eliminates frame distortion and uneven load distribution.
With the conventional rigid axle mounting, uneven floors can cause improper load distribution, chassis distortion, and excessive wear.
THIS
WHEELS ALWAYS ALIGNED
NOT THIS
ONE WHEEL DRIVE
FREE CASTER ACTION
Drive and idler wheels are connected by a tie rod and steer simultaneously. This greatly increases tire life by eliminating scrubbing action.
Uncontrolled action of caster follows and simple steering wheel results in excessive tire damage and wear as well as unnecessary chassis vibration.

Mail Coupon

Write today for free literature with diagrams, data, complete specifications on either or both 2500 lbs. capacity or 4000 lbs. capacity. Mail coupon for yours today

Transveyor
STACKER
A PRODUCT OF AUTOMATIC
Trade Mark *Lightens* LIFE'S LOADS Registered

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC INDUSTRIAL TRUCKS

Automatic 39 West 87th Street Dept. T-2 Chicago 20, Illinois

Please send, without obligation, complete facts on the new Automatic Transveyor ☐ 2500 Lbs. Capacity ☐ 4000 Lbs. Capacity

Company Name.....

By.....*Position*.....

Street Address.....

City.....*Zone*.....*State*.....

World's strongest tape?

It straps 110 lb. cartons of chain to help a chain manufacturer cut costs, win a special award in packaging

TAPE TAKES OVER! "Scotch" Brand Filament Tape securely closes and reinforces telescope cartons containing heavy chains at Morse Chain Co., Ithaca, N. Y. This cost-cutting package design utilizing modern closure and reinforcement recently won a top award from the Society of Industrial Packaging and Materials Handling Engineers—and no wonder!

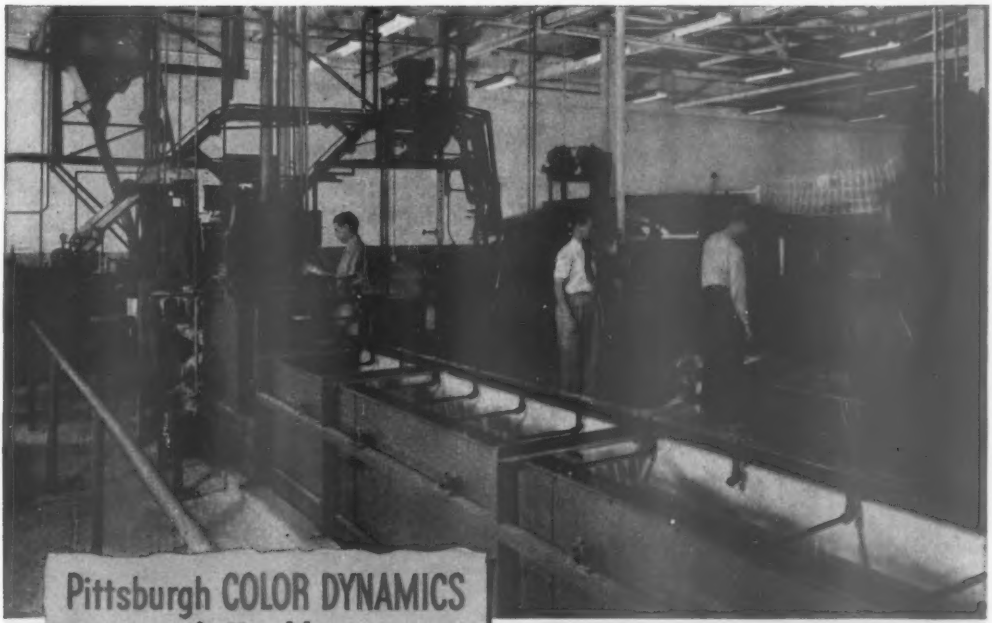
No wonder, either, that T. E. Richards, Traffic Manager at Morse Chain, chose "Scotch" Brand Filament Tape for the job. Rayon or glass filaments give this remarkable tape up to 500 lbs. tensile strength per inch of width. It's easy to apply too, with no sharp edges to injure workers. And since so little goes so far, it can actually cost less to produce a better package.

REG. U. S. PAT. OFF.
SCOTCH
BRAND
FILAMENT
TAPES

Try it yourself and see! Your supplier has all widths and colors—plus dispensers too. The dispenser pictured above is only one of many designed to make tape application faster and easier.

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.



Pittsburgh COLOR DYNAMICS
is Used by GOODYEAR to Reduce Eye Fatigue

Color is put to work in world's most modern tire plant in Jackson, Michigan, to make working conditions more cheerful and pleasant

FAR-SIGHTED executives in many industries are now making Pittsburgh COLOR DYNAMICS an important part of their operations as they are becoming increasingly aware of the fact that eye fatigue often slows down production even more than physical fatigue.

● **When material** the operator is working on is too similar in color to that of his machine, his eyes grow weary, just as the muscles of an arm tire when they are kept tensed for long periods. Needless eye effort is required to differentiate between machine and materials.

● **Eye fatigue** often leads to headaches and other ailments. Absenteeism and accidents are likely to increase. Production efficiency and morale may be adversely affected. One objective of COLOR DYNAMICS is to reduce the causes of eye fatigue.

● **When you paint** the COLOR DYNAMICS way you use *eye-rest* colors for surfaces the operator sees when he glances up from his work. Their chief purpose is to give him a few moments of eye relaxation.

● **An excellent example** of eye-rest colors used according to the principles of COLOR DYNAMICS is the Jackson, Mich. plant of The Goodyear Tire and Rubber Company in which tires and tubes are manufactured for use as original equipment of new automobiles.

● **Here is the comment** of E. T. Ruffner, Plant Manager, on his experience with eye-rest colors: "Three years ago we painted our plant according to COLOR DYNAMICS. Our aim was to lessen eye fatigue among our workers. So completely satisfied are we with the results that we plan to repaint the same way in the near future."

● **COLOR DYNAMICS** has proved similarly successful in hundreds of other important industrial plants and commercial structures. It has earned this acceptance because it improves production efficiency.

● **Why not test** the practical value of this modern painting method in your plant? Use it on a machine or two, or in a completed department, and see the difference it makes in your output.

COLOR DYNAMICS Engineering Study of Your Plant—FREE!

● For a complete analysis of the service COLOR DYNAMICS can perform for you, send for our *free*, profusely illustrated booklet. It explains simply and clearly how to put color to work on machines, walls, floors, ceilings and mobile equipment. Better still, let us show you exactly how to apply it in your plant. We'll be glad to submit a color engineering study of your entire factory, or any part of it, without cost or obligation. Call your nearest Pittsburgh Plate Glass Company branch and arrange to have our COLOR DYNAMICS representative see you at your convenience. Or mail this coupon.

SEND FOR A COPY OF THIS BOOK

Pittsburgh Plate Glass Co., Paint Div.
Dept. FM-102, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your Booklet *"Color Dynamics."*

☐ Please have your representative call for a Color Dynamics Survey without obligation on our part.

Name_____

Street_____

City_____ County_____ State_____

Copr. 1952 Pittsburgh Plate Glass Co., Pittsburgh, Pa.

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

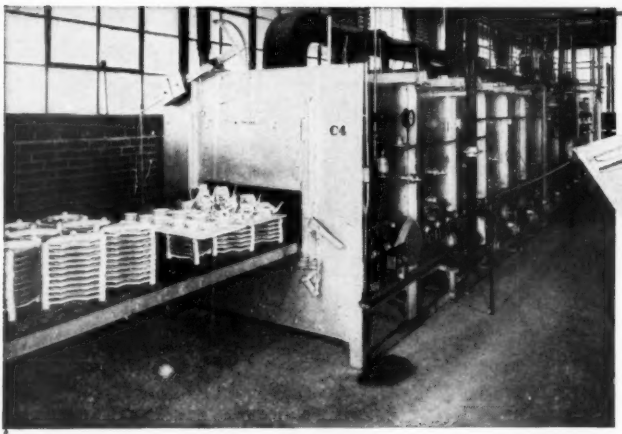
PITTSBURGH PLATE GLASS COMPANY

quality control important...?

GAS gives QUALITY CONTROL

to Gladding, McBean and Company, Los Angeles, California

GAS - THE MODERN FUEL FOR ALL INDUSTRY



Swindell-Dressler Gas-fired Radiant Tube Ceramic Decorating Kiln in operation at Gladding, McBean and Company. Fuel economy, rapid firing cycle and reduced number of rejects are reported with this Modern Gas Equipment.

Modern Industrial Gas Equipment boosted production 10% at Gladding, McBean and Company in 1951. 100,000 pieces a month of this fine china is made there. Pattern shown is Mariposa.

"The making of Franciscan fine China requires the use of the very finest materials. Fuel is no exception, and so we use GAS because it is clean, easily controlled and uniform, providing the finest fuel with which to make the finest china possible."

This is what Mr. Norman DeHoog, China Plant Superintendent at Gladding, McBean and Company says about GAS. The particular operation involved here is firing the over glaze decoration on tableware. When public demand necessitated increasing production at no sacrifice of quality, a modern Gas-fired kiln was utilized.

This modern Gas-fired kiln:

- Increased capacity from 90,000 to 100,000 pieces per month.
- Provides accurate, automatic temperature control.
- Gives clean, heat distribution throughout the firing zone.
- Reduces rejects, while giving a rapid firing cycle and good fuel economy.
- Is clean—a most important factor in this operation.

MORE AND MORE... THE TREND IS TO GAS FOR CERAMIC FIRING

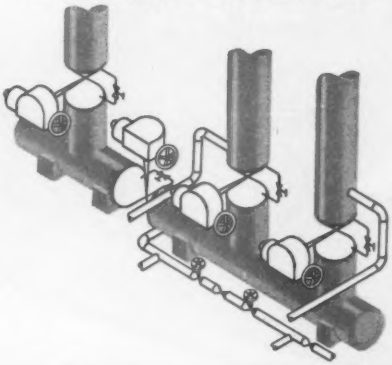
Gas and Modern Industrial Gas Equipment are utilized for glass and ceramics operations because of these features, and because Modern Gas Equipment fits readily into any production line. Economy, Cleanliness, Precise Temperature Control make Gas the ideal industrial fuel. Get the facts today from your Gas Company Representative.

AMERICAN GAS ASSOCIATION • 420 LEXINGTON AVE. • NEW YORK 17, N. Y.

This CRANE VALVE cut the cost of handling steam

Here was a side-by-side comparison between valves of conventional design and Crane Pressure-Seal Bonnet Valves. The high-pressure steam service was identical. The conventional valves gave repeated trouble. Crane gate valves to this day are giving complete satisfaction. You can always buy with greater confidence when you select from the complete Crane line.

Read these Facts of the Case!



Where Installed: Controlling steam direct from boilers operating at 825 pounds pressure, 825 degrees F., in utility power station. Bolted bonnet valves on first units; Crane Pressure-Seal valves on latest addition.

Trouble with Bolted-Bonnet Valves: Records for these valves show repeated repairs for seat leakage and difficulty in keeping bonnet joints tight, almost from start. Also trouble with disc sticking shut.

Performance of Crane Pressure-Seal Bonnet Valves: Giving continuous, completely satisfactory service since installed 4 years ago. Seats and bonnet joints alike remain leak-free, tight as new. Operation remains smooth and positive.

More CRANE VALVES
are used than any other make

CRANE CO. *General Offices:* 836 S. Michigan Ave., Chicago • Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Rolling Everywhere on MONARCHS

● *You find lift trucks everywhere.* • They lift, they store, they place, they transport . . . and they carry the bulk of the material handling work. Many of these power units roll on Monarch Tires . . . specifically Mono-Cushions. • Mono-Cushions cushion the countless shocks, they're easy on the trucks, easy on the loads, easy on the floors and easy on the drivers. • Size for size, Monarch's Mono-Cushions soak up the bumps better and save a lot of maintenance. • *When you need tire replacements, order from your truck manufacturer. He can supply you, through his distributors, with famous Mono-Cushions.*

THE
MONARCH
RUBBER COMPANY
501 Lincoln Park • Hartville, Ohio

SPECIALISTS IN INDUSTRIAL SOLID TIRES AND MOLDED MECHANICAL RUBBER GOODS

IT'S A *New* APPROACH...

IT'S A *True* APPROACH TO THE USE OF COLOR

IN PAINTING Now, instead of a "color scheme" you can have a *color plan* for the interior of your buildings . . . through Barreled Sunlight's *Engineered Color*. It's the newest and truest approach to the use of color . . . one that involves *sound engineering* instead of mere "interior decoration". The result of the combined thinking and experience of top lighting and seeing authorities . . . along with Barreled Sunlight's more than 60 years of specialization in maintenance paints for industrial, institutional and commercial buildings . . . Barreled Sunlight's Engineered Color offers you the surest way to get the best color plan and the finest painting job for the lowest possible cost.

Write for this free catalog on Engineered Color, today. Contains actual chips of every standard Barreled Sunlight Color for inside and outside use, plus complete descriptions and application information for all Barreled Sunlight paint products.

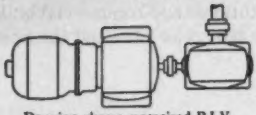
BARRELED SUNLIGHT PAINT COMPANY
2-J Dudley St., Providence, R. I.

Barreled Sunlight ®
Paints

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

Ask yourself these speed reduction questions . . .

1 Do I want high-ratio reduction with right-angle takeoff?

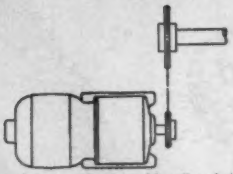


Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1
Torque: 1,400 to 123,000 in. lbs.
Output shaft rpm: 0.22 to 564

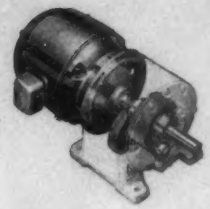
2 Is space at a premium?



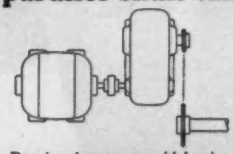
Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor

Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 30
Output shaft rpm: 6 to 280



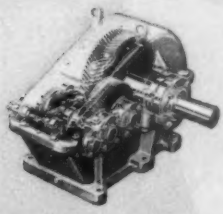
3 Will I need high hp capacity with parallel shaft takeoff?



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600



Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

LINK-BELT

ENCLOSED GEAR DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4. Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,059

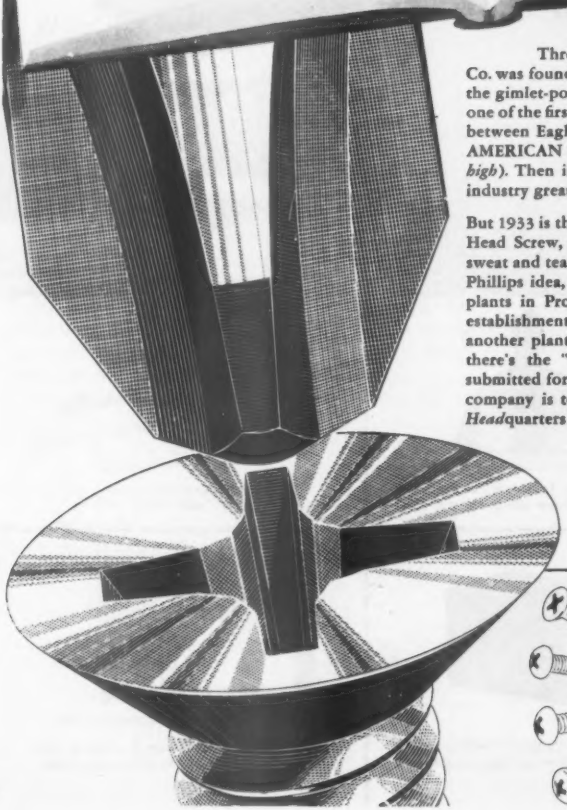
THE AMERICAN STORY

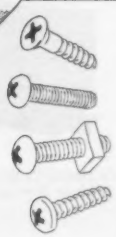
CHAPTER I:

"Family Tree"

Thread of this story begins in 1838, when the Eagle Screw Co. was founded in Providence. Next major event was in 1850, when the gimlet-pointed wood screw was given to industry. Next, in 1860 one of the first significant mergers in American industry was arranged between Eagle Screw and New England Screw Co. The new name: AMERICAN SCREW COMPANY (*and the eagle trademark still flies high*). Then in 1876 came the invention of the *rolled thread*, giving industry greater production at lower cost.

But 1933 is the red-letter date—the birthdate of the Phillips Recessed Head Screw, pioneered by American after several years of "blood, sweat and tears". And in succeeding years, with the acceptance of the Phillips idea, American Screw Co. outgrew its several old-fashioned plants in Providence—and in 1950 moved to its present 87-acre establishment in Willimantic, Conn., which is supplemented by another plant in Norristown, Pa., and a warehouse in Chicago. So there's the "time-capsule" history of American Screw Company, submitted for the record as interesting evidence of how and why the company is today Fastening Headquarters — and especially, *Phillips Head*quarters — for the industry of America and the world at large.





AMERICAN SCREW COMPANY

PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

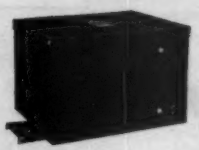
Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.

400 or 1,000-watt millite luminaires, 18′ to 30′.

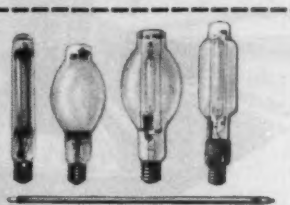
400-watt, lock-lite luminaire, used in machine shop shown above.

3,000-watt mercury luminaire, 40′ and over.

1,000-watt mercury high-bay, 25′ and over.



Complete range of ballasts for high or low-voltage systems.



Complete range of lamps, including new color-corrected J-H1, 400-watt lamp.

More light for 1/3 less cost

with Westinghouse MERCURY lighting

Today's mercury lighting systems produce more light per luminaire than any other lighting system. That's why it's economically practical to step up your lighting standards and still save money.

For example, in the case of this machine shop in California, an engineering cost analysis showed a saving of 30% on initial cost, as compared to other systems considered. Efficiency really improved. Employees go so far as to say, "It's easier to see on the night shift now, than it is on the day shift". Here's evidence that the working area is shadow free.

What's more, maintenance costs are drastically cut with mercury lighting. Less than half as many fixtures to maintain—fewer lamps to replace.

It's important to you to investigate Westinghouse mercury lighting systems. You'll find a complete line for every phase of plant operation: 400, 1,000, 3,000-watt units for low or high-bay areas—open or closed fixtures for clean or dirty locations—low or high-voltage ballasts for any distribution system. Only Westinghouse can furnish you a complete mercury lighting system. Send today for B-4727, "Westinghouse Lighting at Work in Every Industrial Area", Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

J-04321

YOU CAN BE SURE...IF IT'S

Westinghouse

LIGHTING DIVISION

Edgewater Park, Cleveland, Ohio

MOTOR STARTERS

Manual Magnetic Combination

ACROSS-THE-LINE STARTERS are easy to install and wire—compact enough to be installed on or near the controlled machine. Manual Starters in sizes 0 and 1, Magnetic in sizes 0-7 for motors from fractional to 600 hp, Combination in sizes 0-5. General Purpose and special enclosures to fit every need.

Manual Magnetic

REDUCED-VOLTAGE STARTERS are used where the power system has insufficient capacity for full-voltage starting . . . to safeguard machinery or processes from high starting torque or current inrush. Choose from autotransformer, reactor and resistor types. Wide line available.

STARTERS for

Choose From This Wide Selection of Generously Designed Starters . . . Backed by Broad Application Experience in Every Industry

WHATEVER YOUR CONTROL NEED — starting, smooth acceleration, speed control, stopping, reversing, dynamic braking — there is an Allis-Chalmers starter to do the job. All are easy to install and have construction features that assure long life, dependable operation, simplified inspection.

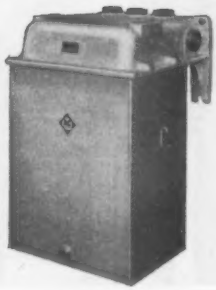
Low-Voltage Starters, Sizes 0-3 for example, have silver-to-silver double break contacts that never require dressing. A screwdriver is the only tool you need for inspection of magnet coils, heaters, contacts — all replaceable parts.

Sizes 4-7 have time-proven clapper-type contacts with rolling-wiping action to keep current carrying areas clean, free of pitting and arcing. Current is interrupted quickly and arcing minimized by chutes of new design. All electrical and mechanical parts are easily accessible.

High-Voltage Starters give you everything needed for complete motor control and protection in a single enclosure. Contactors, meters, overload relays, auxiliary switches — all needed parts are selected to meet the requirements of your application. Enclosures are compartmented to isolate high-voltage devices. If you need the short circuit protection of current limiting fuses, specify Type H high-voltage starters.

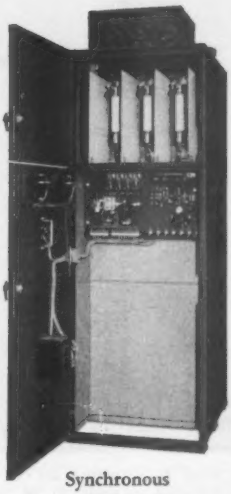
Remember, A-C application engineers have wide experience serving all industry. Their experience, plus this broad line of starters, is your assurance of the right starter for your job. Call your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

MOTOR STARTERS



Squirrel-Cage

THE TYPE 371 Wall-Mounted Starter for 2300-volt motors is completely sealed . . . protects the completely oil-immersed mechanism from weather, corrosion and dust. Wall mounting saves space.



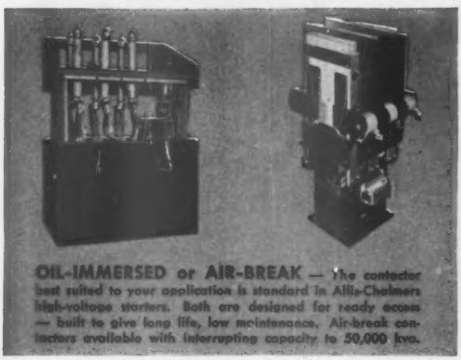
Synchronous

ALLIS-CHALMERS Synchronous Motor Starters apply field excitation automatically when proper speed is reached . . . even select the exact half cycle for smoothest field application.

Wound-Rotor

WOUND-ROTOR Motor Control for either starting or speed control duty, is built with the number of accelerating points your application requires. High-Voltage Starters are built for motors to 2500 hp.

Every Motor Need!



OIL-IMMERSED or AIR-BREAK — The contactor best suited to your application is standard in Allis-Chalmers high-voltage starters. Both are designed for ready access — built to give long life, low maintenance. Air-break contactors available with interrupting capacity to 50,000 kva.

Allis-Chalmers, Milwaukee 1, Wisconsin

Send for These

Send me the bulletins indicated below:

- ☐ High-Voltage Starters - - - - - - 1486410
- ☐ Type 371 Wall-Mounted Starter - - - 1487274
- ☐ Type 256 Air Contactor - - - - - - 1487303
- ☐ Low-Voltage Across-the-Line Starters - - 1487132
- ☐ Low-Voltage Reduced-Voltage Starter - - 1487215
- ☐ Control Devices - - - - - - - - 2587095

Name.....

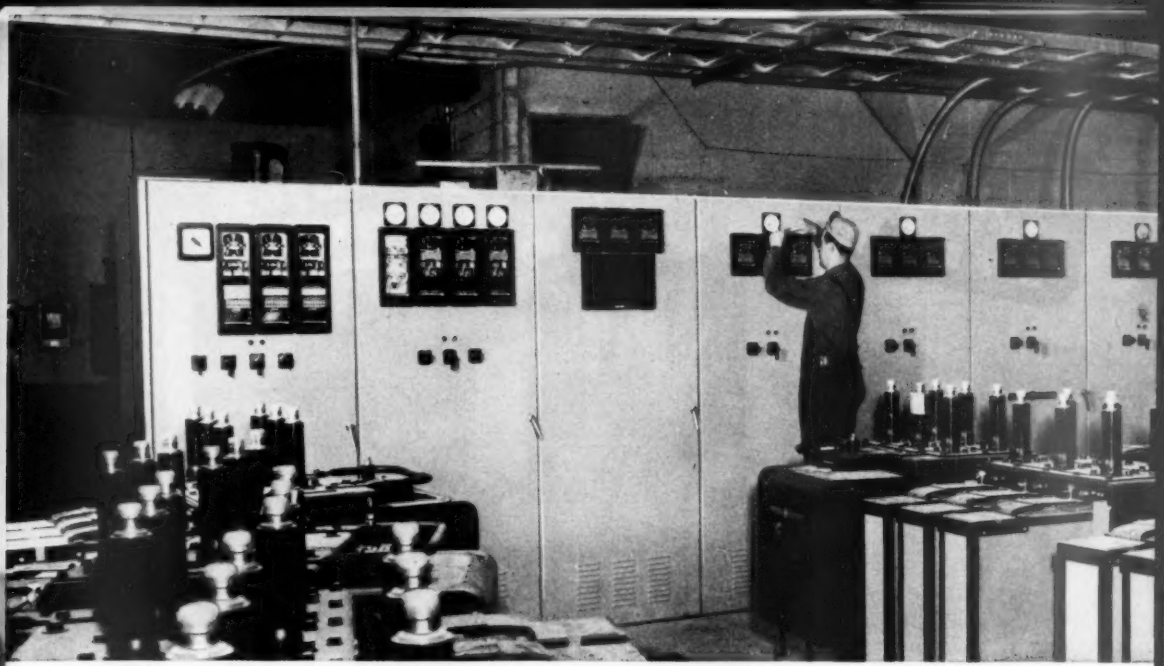
Title.....Company.....

Address.....

City.....State.....

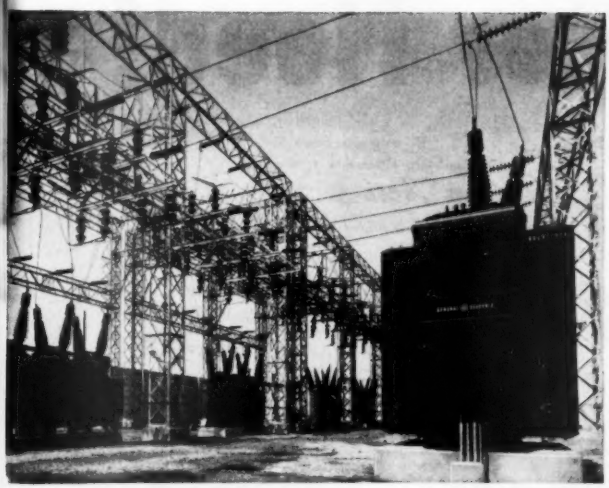
A-3529

ALLIS-CHALMERS



IMPROVED G-E METAL-CLAD SWITCHGEAR shown being installed above, has many new features that provide for increased safety and protection against power shut-downs. Units in the foreground are removable 13.8-kv G-E magne-blast circuit breakers, ready to be moved into all-steel switchgear compartments. Switchgear unit was supplied fully assembled, ready to connect.

How General Electric Switchgear Helped



OUTDOOR SUBSTATION, built entirely from standard units, including transformer, oil circuit breakers and complete steel structure. Standard units saved months in planning and installation.

LOAD-CENTER UNIT SUBSTATION, one of 18 installed in plant, supplies low voltage power close to machines—eliminates voltage drop encountered with long, low-voltage feeder systems.

SHADOW-PROOF INSTRUMENTS with new, easier to read, long scales, are typical of many advances featured in improved G-E Metal-clad Switchgear. Instruments enable constant check to be kept on many circuits feeding power throughout plant.

REMOVABLE MAGNE-BLAST CIRCUIT BREAKER, offers maximum accessibility for testing and inspection—may be easily replaced with a spare if necessary. Adequate interrupting capacity gives full protection against electrical failures.

Speed Major Production Change-over

Standard equipment helps solve difficult conversion problem —gets defense plant in production 3 months ahead of schedule

When one of the nation's biggest manufacturers planned to convert a 53 acre light duty assembly plant into the country's largest tank arsenal, electric power requirements posed a major problem. To handle the tremendous demands of such a heavy industrial operation, a completely new power distribution system was needed. It had to be dependable, with maximum protection against power shut-downs. And it had to be installed fast, to meet an almost "impossible" production schedule.

Based on recommendations of General Electric engineers, this plant got one of the finest and most dependable power distribution systems ever installed in an American factory. What's more, they got it in record time.

All power used throughout the plant flows through standard G-E Metal-clad switchgear. Supplied factory-assembled, ready for installation, it saved months of time-consuming on-the-job engineering and assembly. Having the entire power distribution job handled as a co-ordinated project by G-E engineers was an essential part of the excellent planning that resulted in starting production three months ahead of schedule.

For examples of the equipment used, see the pictures at left and above. For information on how similar equipment can help your modernization or expansion plans, send for Bulletin GEA-5600, "Electric Power for Industry's Third and Biggest Expansion"—or call your local G-E Apparatus Sales Office. General Electric Company, Schenectady 5, New York. 854-47

GENERAL ELECTRIC

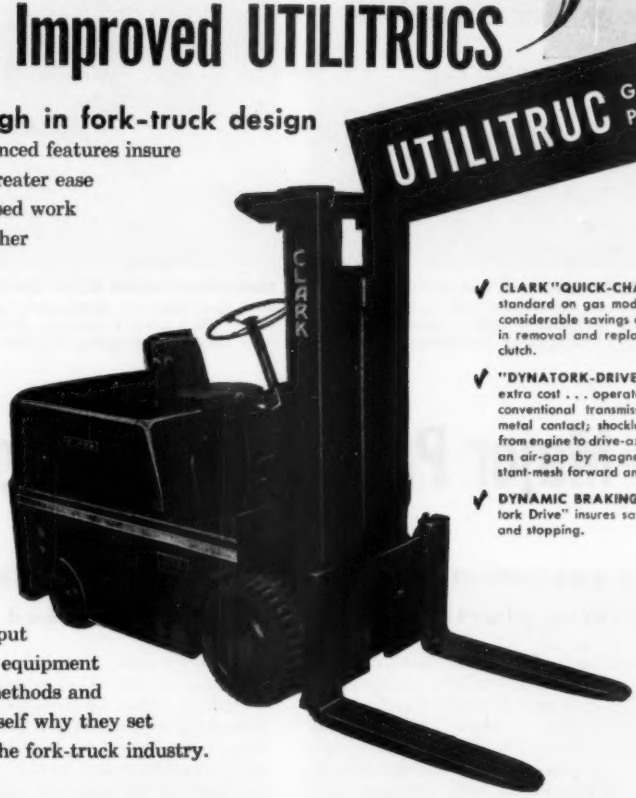
They're as Modern as your planning for the Future

NEW

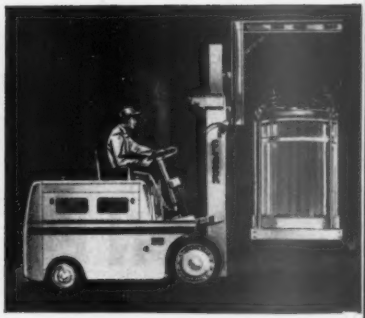
The NEW, Improved UTILITRUCS

. . . set a new high in fork-truck design and construction. Advanced features insure longer life, lower cost, greater ease of operation, and increased work capacity. They are rougher and tougher than any handling job in the 6,000-7,000-pound range, that any stevedoring boss, foundry boss or steel-mill foreman can dream up.

The detailed features of these new UTILITRUCS show why they master the ever-increasing burdens put upon materials handling equipment by modern production methods and techniques. See for yourself why they set new high standards for the fork-truck industry.



- ✔ **CLARK "QUICK-CHANGE" CLUTCH...** standard on gas model; makes possible considerable savings of time and money in removal and replacement of a worn clutch.
- ✔ **"DYNATORK-DRIVE"** . . . available at extra cost . . . operates without clutch or conventional transmission; no metal-to-metal contact; shockless flow of power from engine to drive-axle applied through an air-gap by magnetic induction. Constant-mesh forward and reverse gearing.
- ✔ **DYNAMIC BRAKING** . . . with "Dynatork Drive" insures safe, smooth slowing and stopping.



6-7000 lb FORK TRUCKS BY CLARK EQUIPMENT

BOTH *POWER* TYPES...
HAVE ALL THESE IMPROVEMENTS

- ✓ **COMPACT—MANEUVERABLE** . . . turning radius well within limitations of practical aisle widths.
- ✓ **NEW FORK MOUNTING** . . . approved and recommended by the Industrial Truck Association for interchangeability of attachments and devices between all makes of trucks of comparable capacity.
- ✓ **25" FREE-LIFT** . . . and greater total lift for higher tiering afforded by new upright design; no increase in upright height.
- ✓ **INCREASED DRIVER VISIBILITY** . . . facilitates faster, smoother and safer operation.
- ✓ **CENTER-PIVOTED STEERING AXLES** . . . with rubber-mounted bushings and angularly-placed tie-rods to absorb road shock.
- ✓ **EASE AND CONVENIENCE OF SERVICE** . . . greater accessibility to engine in gas models, and to motor and controller in electric models.
- ✓ **INCREASED DRIVER COMFORT** . . . all controls within easy reach and on gas models all instruments, including ignition switch and starter button, are placed conveniently in a dash panel.
- ✓ **CUSHION TIRES STANDARD**

UTILITRUC ELECTRIC BATTERY POWERED

- ✓ **INCREASED TRAVEL SPEED** . . . brings maximum to 6 M.P.H.
- ✓ **INCREASED LIFTING SPEED** . . . 12% to 16% faster, with easy fingertip controls.
- ✓ **AUTOMATIC ACCELERATION** . . . eliminates "jerky" starts; protects motor from abusive application of power.
- ✓ **LARGER BATTERY COMPARTMENT** . . . permits use of wider range of batteries; side-removal speeds servicing.
- ✓ **PROTECTION AGAINST DUST AND DIRT** . . . drive motor and pump totally enclosed.
- ✓ **INCREASED BRAKING EFFICIENCY** . . . "deadman" parking brake functions automatically when driver leaves seat.
- ✓ **DYNAMIC BRAKING** . . . for safety and smoothness.

Your next step? Write for your free copy of the current issue of Material Handling News. Read the story of how CLARK Serves You Right—in engineering, production, technical counsel and world-wide service. Its title: "SERVES YOU RIGHT!"

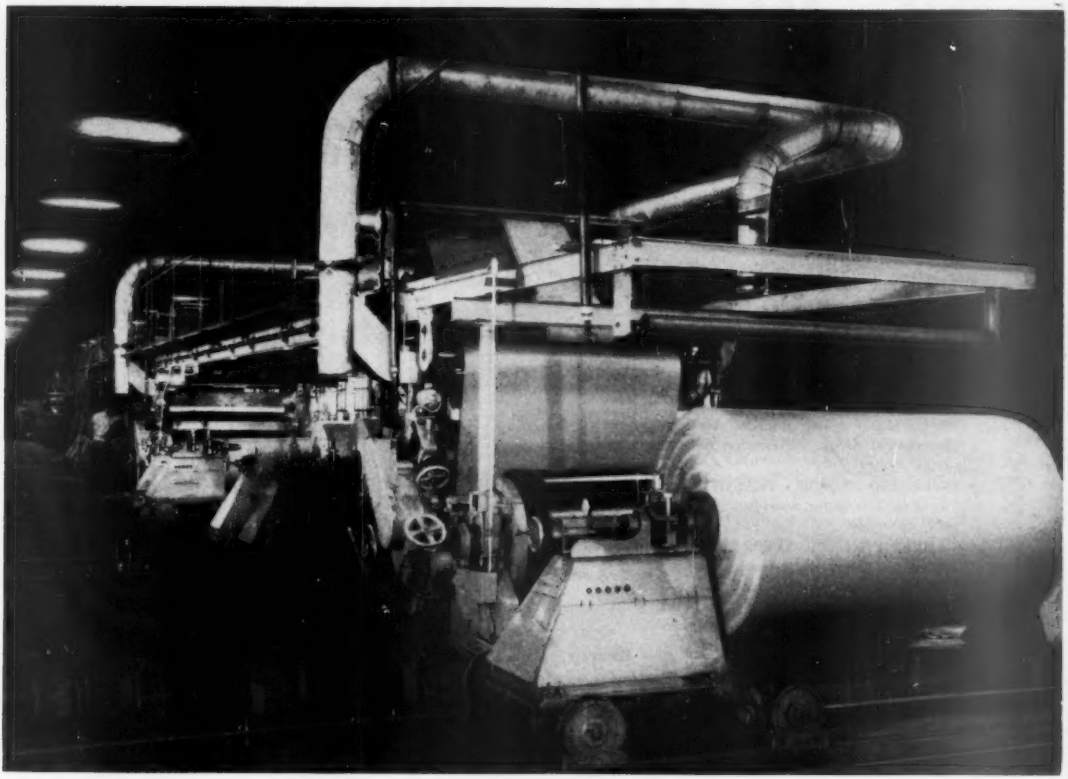
CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 12, MICHIGAN
Please send: ☐ Utilitruc literature ☐ Material Handling News
☐ Have Representative Call.

Name_____
Firm Name_____
Address_____
City_____ Zone____ State_____

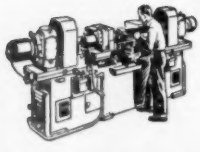
LINK-BELT ball and roller

... keep company with America's hardest-



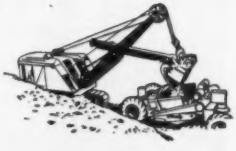
The bearings for this Swift Single and Double-Facing Corrugating Machine, in operation at Connelly Containers, Philadelphia, must meet such varied conditions as heavy pressure, high temperatures and close precision. Many types and sizes of Link-Belt Bearings are used.

LINK-BELT ball and roller bearings

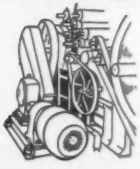


Metal Working Machinery

Farm Machinery



Construction Equipment



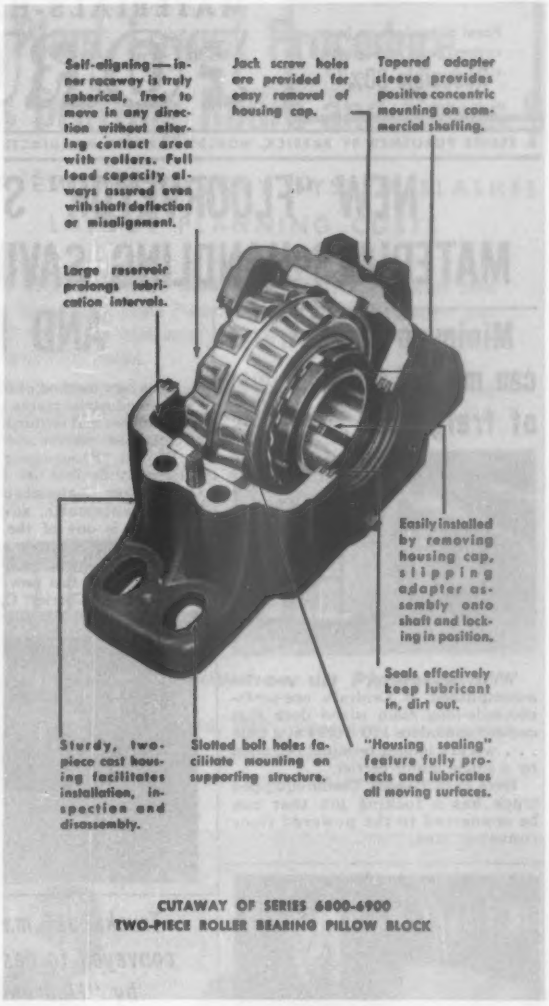
Textile Machines

bearings
working machines

YOU can always rely on Link-Belt Ball and Roller Bearings. Built to the highest standards of modern precision manufacture, they assure long-life, free-rolling shaft support — even with shaft deflection or misalignment.

And you can get a size and type to match your exact bearing requirements. Link-Belt builds a complete line of industrial mounting designs—pillow blocks, flanged, flanged cartridge, cartridge, hanger and take-up blocks — in addition to unmounted bearings.

For application information, get in touch with a Link-Belt bearing engineer. Complete engineering data is also available in Book 2550.


Self-aligning — inner raceway is truly spherical, free to move in any direction without altering contact area with rollers. Full load capacity always assured even with shaft deflection or misalignment.
Jack screw holes are provided for easy removal of housing cap.
Tapered adapter sleeve provides positive concentric mounting on commercial shafting.
Large reservoir prolongs lubrication intervals.
Easily installed by removing housing cap, stripping adapter assembly onto shaft and locking in position.
Seals effectively keep lubricant in, dirt out.
Sturdy, two-piece cast housing facilitates installation, inspection and disassembly.
Slotted bolt holes facilitate mounting on supporting structure.
"Housing sealing" feature fully protects and lubricates all moving surfaces.

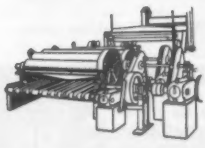
CUTAWAY OF SERIES 6800-6900
TWO-PIECE ROLLER BEARING PILLOW BLOCK

LINK-BELT
BALL and ROLLER BEARINGS

LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities.

12.909

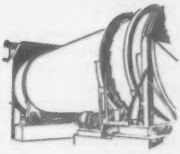
smooth the path of power for all industry



Pulp & Paper Machinery

Materials Handling Equipment

Oil Field Equipment



Processing Equipment

Panel discussions on how casters help reduce the **"Reducible 30%"***

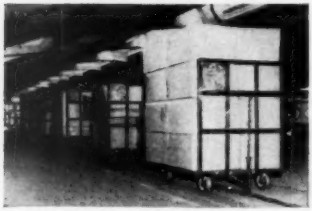
MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

NEW "FLOORVEYOR" SYSTEM SUGGESTS MATERIALS-HANDLING SAVINGS FOR WAREHOUSES AND INDUSTRIAL PLANTS

Minimum manpower can move 6,000,000 lbs. of freight in 24 hours



With "Floorveyor", this can be accomplished at Central's one-tenth-of-a-mile-long main island dock that can accommodate 110 trucks at a time . . . world's largest terminal occupied by a single motor carrier.

Here each Bassick Caster-equipped truck has a locking pin that can be connected to the powered floor conveyor line.

This new method of materials-handling in industrial plants, particularly in warehouses and terminals, is attracting widespread interest and attention.

Called "Floorveyor", it permits extremely flexible use of floor trucks . . . makes materials-handling practically automatic, saving valuable labor. It is one of the thousands of ways Bassick Casters are helping to cut materials-handling costs.

Pioneers in this new technique are Texas Motor Carrier, Central Freight Lines Inc., and Philadelphia's wholesale drug distributor, Smith, Kline and French, Incorporated. Central's 47,580 sq. ft. dock (large photo, below) and the warehouse of Smith, Kline and French, Incorporated (smaller photo) both show the "Floorveyor" system . . . the trucks are equipped with Bassick Casters.

MANUAL OPERATIONS VIRTUALLY LIMITED TO LOADING AND UNLOADING

After releasing the locking pin, this worker removes the truck from "Floorveyor" and moves it manually only a short distance.

The only other manual operations were the initial loading and moving of the truck, and setting it into the "Floorveyor" . . . a great time- and labor-saving advance in materials-handling.

Trucks automatically conveyed to destination by "Floorveyor"

This worker at Central's Dallas terminal is getting ready to drop the locking pin into the "Floorveyor" channel, which will then move it to the desired point.

The Bassick Casters used on the trucks in Dallas have given excellent service and have been selected for use in the new Houston, Texas Terminal.

Full caster information available upon request

Write for full data on Bassick Casters, the world's largest line with the sizes and types for everything you wish to move easily, quietly, efficiently. There is a local distributor of industrial supplies in your vicinity who handles Bassick Casters, Wheels and Locks for every need. Factory engineering assistance readily available. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

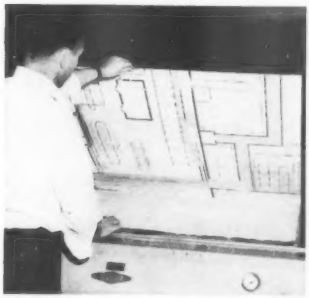
*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick — A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS | MAKING CASTERS DO MORE

1. YOU MAKE YOUR FLOOR PLAN by outlining permanent plant features with gummed tapes or inked lines on specially white-surfaced aluminum plates printed with a ¼" grid. These light, accurately squared, and easily handled plates can be butted together to represent any large area.

2. POSITIONING OF SCALED PLASTIC TEMPLATES and pre-printed tapes representing machine tools, conveyors, benches, aisles, etc. is the next step. You reproduce templates in multiples on sensitized plastic by photocopy from a drawn original. Double-sided adhesive tape allows movement of templates and rearrangement at any time.



3. NO COSTLY TRACING OR DRAFTING. As the layout progresses, you make photocopies of each completed plate quickly and easily on a Peerless vacuum-bed printer. From these, any number of vellum positive reproductions can be made in exactly the same way. Millwrights work directly from blueprints made from these copies when installing machines and equipment.

New Plant Layout Procedure Cuts Drafting Hours and Saves $$

PEERLESS PHOTOCOPY SYSTEM SLASHES LAYOUT PLANNING COSTS

NOW USED BY LEADING INDUSTRIAL CONCERNS. Originally developed by Industrial Photo Products Co. of Detroit, this modern plant layout system has been installed in many mass production plants in the automotive capitol.

It is now available on a national basis through Peerless Photo Products, Inc. and its distributors, who can supply all equipment and materials used in the procedure.

For complete and expert advice, please write us.

Send today for free MODERN PLANT LAYOUT leaflet.

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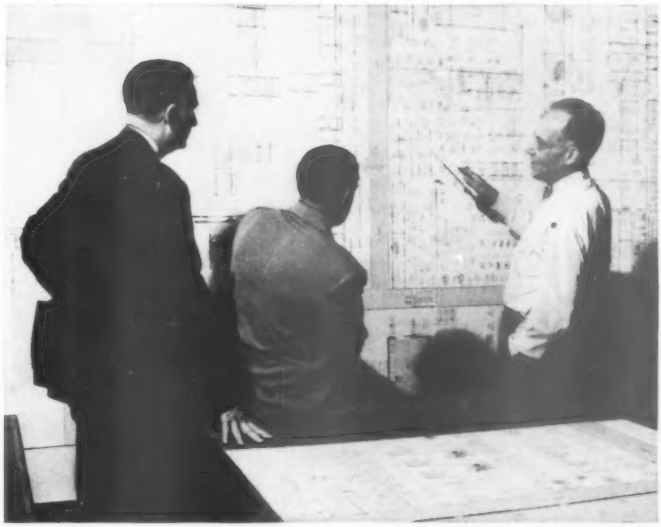
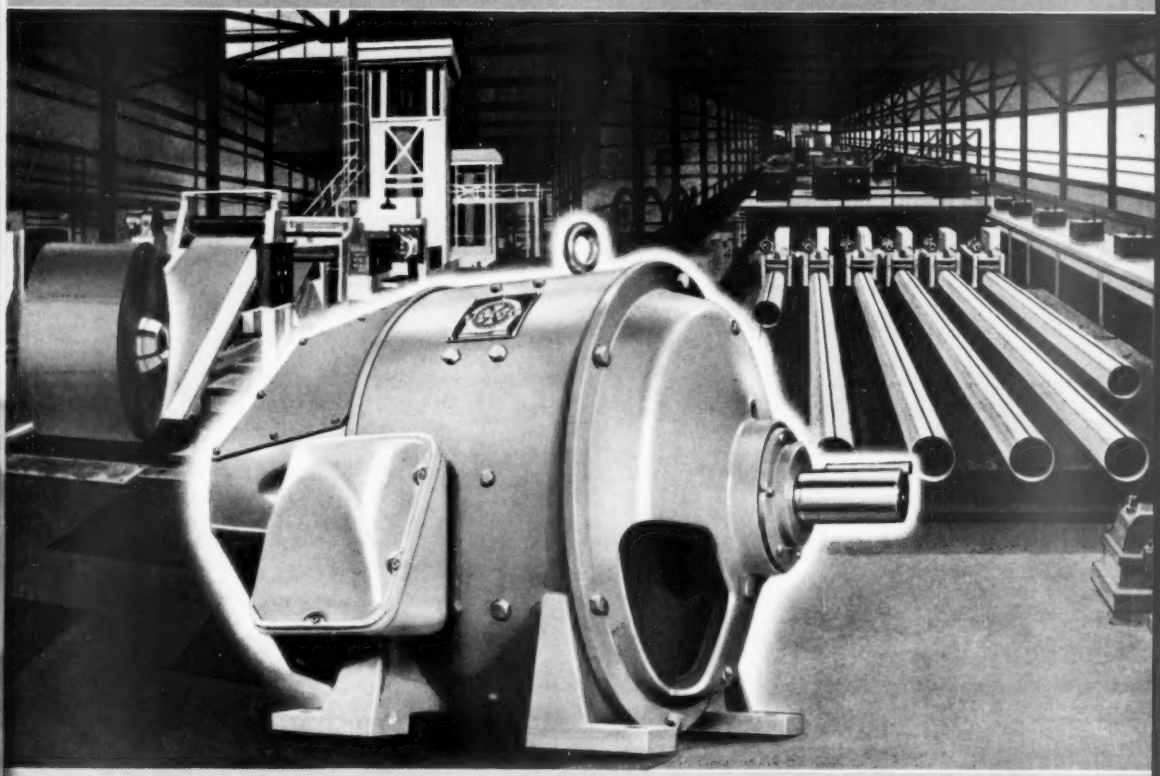


4. FOR CONFERENCE AND REFERENCE, Peerless layout plates are hung on walls or laid out on large tables so that engineers can view the whole plant area at once. When revisions are required, photocopy reproduction replaces slow, expensive drafting.

For tough power jobs...



RELIANCE

TYPE 'T' HEAVY DUTY

D-C. MOTORS

3/4 TO 1000 HORSEPOWER

"The Toughest Motors Ever Built"

and precise speed control

This sturdy, versatile DRIVE MOTOR *meets all your requirements for*

- ✔ UNLIMITED SPEED CHANGES
- ✔ CONTROLLED ACCELERATION AND DECELERATION
- ✔ JOGGING, INCHING, CREEPING
- ✔ SMOOTH STARTING, QUICK STOPPING

Early Reliance developments in drive motors gave industry wider ranges of speed adjustments than any motors previously available. And Reliance has specialized ever since in drive motors combining heavy duty construction for the toughest power jobs with precise speed control to meet your most exacting requirements. Use Reliance Type 'T' Heavy Duty Drive Motors on the most grueling applications and your experience will reveal why long-time users have called them "*The Toughest Motors Ever Built*". Get dependable motor response to all-electric control in a Reliance-engineered drive and you have the means of achieving and maintaining maximum production from any machine.

WRITE for D-c. Motor Bulletin C-2001 and Bulletin D-2311 which highlights the role of Reliance adjustable-speed drive motors in single and multi-motor drive systems.

HOW RELIANCE ENGINEERING adapts the motor to your specific power needs...

Reliance adjustable-speed drive motors are engineered to respond instantly and accurately to the signals of associated controls and regulators in any motor-drive system. Co-ordinating mechanical design, horsepower and speed range of the motor with other components in a drive is the specialized job of Reliance Application Engineers. Their application experience and practical production knowledge give you whatever operating flexibility is required to produce more goods at less cost.

Sales Offices in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

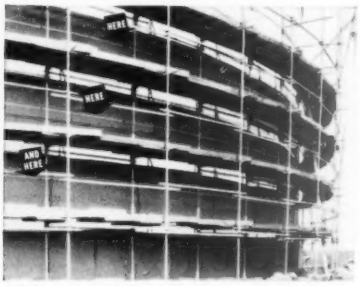
1070 Ivanhoe Road, Cleveland 10, Ohio • Canadian Division: Welland, Ontario

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

...and saves money in surprising ways!

A SKID-LOAD OF BRICKS is bound quickly and securely with Acme Steel strapping. This makes it easy for the shipper or user to pick up, carry, load, store or tally many bricks at a time, with mechanical power instead of manpower.

THESE BIG TANKS are going all the way from Minnesota to a new works out in Washington. They roll clear across the country but they don't roll off the flatcars because a few loops of Acme Steel strapping hold them safely in place.

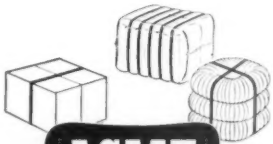


HERE'S A HUGE oil storage tank in process of construction. The arrows point to Acme Steel strapping, securely holding the insulation in place.

You might think that Acme Steel strapping doesn't have much to do with you. At least you seldom see it. But almost everything you use—from food and drink to the very bricks and wood to build your home—comes at least part way to you protected by steel strapping.

Yes, Acme Steel strapping insures Safe Arrival. It not only reduces shipping costs, it also serves (and saves) in many other ways . . . wherever secure fastening and low labor and materials costs are needed.

Write for details to Acme Steel Products Division, Dept. FMM 102.



ACME STEEL

ACME STEEL COMPANY

2849 Archer Avenue, Chicago 8, Illinois

apron
conveyors
RUGGED CONVEYORS for handling coal . . . coke . . . crushed stone . . . burnt lime . . . hot sand from shake-out.
Inclined or Horizontal
— Can be Made Leak-Proof

THE JEFFREY MANUFACTURING COMPANY

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NO OTHER

OWENS-CORNING

FIBERGLAS

IF YOU MAKE OR USE

ELECTRICAL EQUIPMENT

IT WILL PAY YOU TO SPECIFY

FIBERGLAS* *insulating materials*

Many electrical insulating materials used in apparatus, wire or cable soon break down under the ravages of oils and acids. This means costly down-time for repairs or complete replacement.

That's why today, more and more makers and users of electrical equipment are specifying insulating materials made with Fiberglas yarns. Because they are made of glass in fibrous form, Fiberglas yarns resist deterioration from oils and acids better than organic yarns.

Fiberglas tapes, varnished cloths, sleeving and tubing, cords, wire and cable insulations, and laminates, as used in electrical apparatus resist rot and corrosion from oils and acids . . . deliver top service at higher operating temperatures.

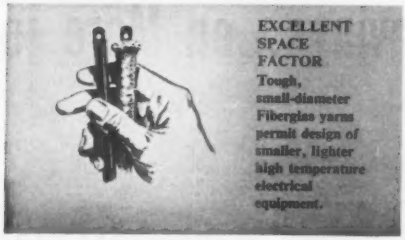
So, if you're a maker or user of electrical equipment, remember to specify Fiberglas.

Owens-Corning Fiberglas Corporation, Electrical Sales Division, Dept. 85, 16 East 56th St., New York 22, N.Y.

FIBERGLAS YARNS ALSO GIVE YOU THESE COST-SAVING ADVANTAGES

MOISTURE RESISTANCE
Wire, cable, and apparatus resist moisture better, if they're made with Fiberglas materials.

HEAT RESISTANCE
Fiberglas insulating materials resist break-down under heat.

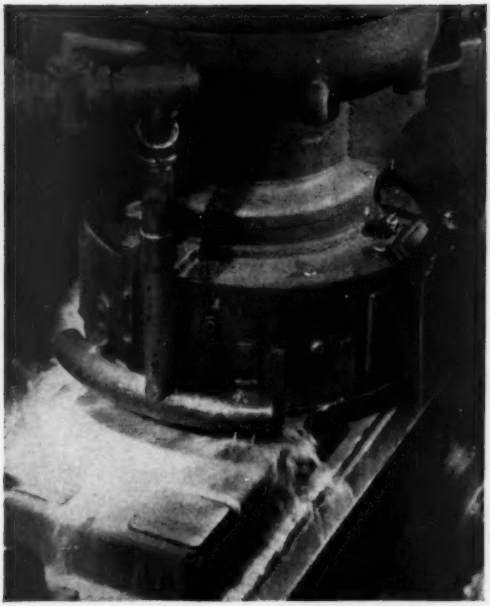


EXCELLENT SPACE FACTOR
Tough, small-diameter Fiberglas yarns permit design of smaller, lighter high temperature electrical equipment.

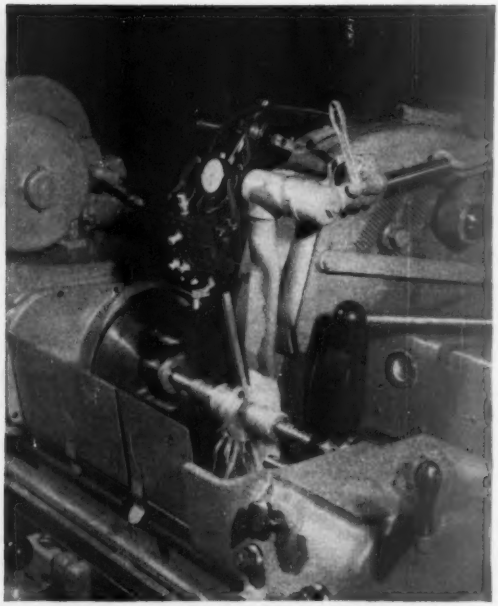
HIGH TENSILE STRENGTH
Even in small diameters, Fiberglas yarns have higher tensile strength than other insulating textiles.

GOOD GUIDE TO A GOOD BUY!

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation.



SURFACE GRINDING. For fast, cool cutting action Norton wheels, cylinders and segments are unbeatable. 32 or 38 ALUNDUM abrasive for hardened steels and CRYSTOLON abrasive for gray iron and non-ferrous metals.



O.D. GRINDING. Norton O.D. wheels in the abrasives, grain sizes and bonds for best results on every material are sure protection for big grinding machine investments.

NORTON BRINGS YOU

More types of abrasive products...

for More savings...on More jobs

You'll find the right answers to every one of your grinding problems in the Norton line of abrasive products. First, because it is the world's most complete line — offering you more choices than any other. Second, because Norton Research — which has chalked up an impressive list of "firsts" in abrasive development and Norton's endless field testing — make sure that every Norton abrasive product will deliver top performance on the work it is designed for.

That's the combination of variety and efficiency that will cut time, labor and costs on every grinding job you do.

SEE YOUR NORTON DISTRIBUTOR for practical help in any grinding application. He knows Norton products — what they will do and what they won't do — and you'll find that his aid in selecting the right ones for *your* jobs is a real short cut to better, lower cost grinding . . . NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products to make other products better

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

TOOL AND CUTTER GRINDING. Norton New-Process wheels have no equal for uniformity, identical wheel performance and long even wheel wear. 32 ALUNDUM* abrasive for carbon and alloy steel, CRYSTOLON* abrasive for cemented carbides.

MOUNTED WHEELS AND POINTS. Hundreds of sizes and shapes for smooth-as-silk cutting action, with no bounce or vibration. Each one is trued on its own spindle to eliminate "breaking in" and to insure its running absolutely true.

POLISHING AND LAPPING. ALUNDUM grain comes in surface treatments and grain sizes for best results on every polishing job. And precise sizing makes ALUNDUM and CRYSTOLON abrasives favorites for even the fussiest lapping jobs.

ROUGH GRINDING. On swing frames, floor stands or portable grinders, Norton wheels "hug that work," to cut time and costs. And Norton *Reinforced Hub* Wheels are the safest, most versatile ever made.

BARREL-FINISHING. ALUNDUM tumbling abrasive, being *all* aluminum oxide, cuts without glazing, and has the hardness and toughness to stand repeated use. It's the abrasive for real precision-finishing.

DISC GRINDING. Norton ALUNDUM and CRYSTOLON discs boost production and reduce down-time. They leave flat surfaces straight and smooth, with no excess heat to cause warpage.

INTERNAL GRINDING. Being identical in grinding action, Norton *New-Process* wheels can be changed without machine adjustments. That and uniform top performance make them valuable production boosters.

CUTTING-OFF. For wet or dry applications, high or low speeds, on any material, there's a Norton wheel in ALUNDUM or CRYSTOLON abrasive that's "made to order" for fast, economical cutting off.

ALL-STEEL

DODGE-TIMKEN PILLOW BLOCKS

Rugged!

Compact!

HERE are the bearings for industry's toughest jobs—in the most compact and rugged "package."

High radial and thrust capacities. Stamina to take heavy shock loads. All-steel construction that packs this load-carrying capacity into less weight and less space than ever before.

This brilliant achievement has been accomplished through pooling the engineering resources and bearing-building experience of Dodge and Timken. This new line so completely fills a need that engineers are already specifying "Dodge-Timken All-Steel" for some of America's heaviest machinery and largest industrial projects.

Completely assembled, permanently adjusted, lubricated and sealed at the factory, these All-Steel pillow blocks are shipped ready to go to work—wherever in industry the going is tough!

For detailed information and delivery dates write to Dodge, or call your Dodge Distributor.

DODGE

CALL THE TRANSMISSIONEER your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

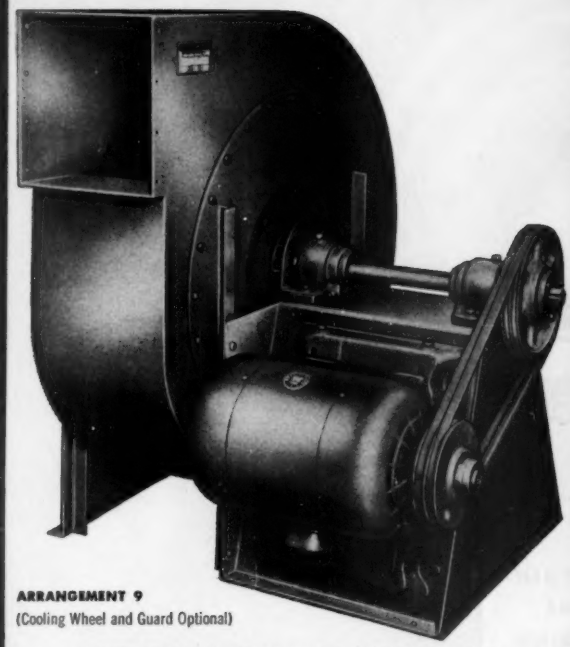
A JOINT ENGINEERING DEVELOPMENT BY DODGE AND THE TIMKEN ROLLER BEARING COMPANY

SHAFT SIZES: $2^{15}/_{16}$ to 10 in.

- All-Steel construction
- A new Timken bearing design
- High radial and thrust capacities
- Compact—minimum dimensions
- Minimum weight; maximum strength
- Fully self-aligning with spherical outer race
- Both expansion and non-expansion types
- Adapter mounting, proven through the years
- Double piston ring seals
- Sealed both on and off the shaft
- Fully assembled, permanently adjusted, lubricated and sealed at the factory

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Indiana

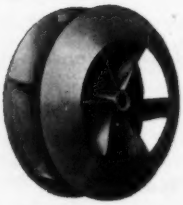
ANOTHER NEW STURTEVANT DEVELOPMENT!



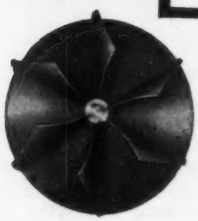
ARRANGEMENT 9
(Cooling Wheel and Guard Optional)

The new Sturtevant Industrial Fan is available in four standard arrangements and a choice of three wheel types. It can be furnished for chain or belt drive as well as direct-connected motor drive.

FOR EXHAUSTING
The Air Handling Wheel, with its backwardly inclined blades, gives you the highest operating efficiencies on the market today for general industrial air handling. It is particularly suitable for exhausting smoke, fumes, gases and light dusts from industrial processes as well as for oven circulation, heat treating and drying applications. Power consumption is low over a wide range of volumes and pressures.



FOR MATERIAL HANDLING
The Material Handling Wheel is a heavy-duty, radial-bladed, side-plate type designed for general purpose material handling. It is especially applicable to grinding and buffing wheel exhaust systems, and for conveying such materials as sawdust, granular particles and chips. This wheel combines high fan efficiency with its material handling features.



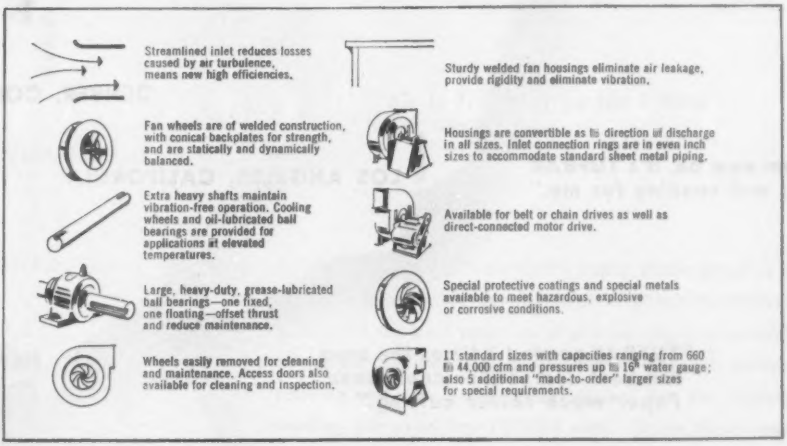
FOR SPECIAL APPLICATIONS
The Long Shavings Wheel is a material handling wheel without side plate. It has been designed particularly for those material handling jobs where long, stringy materials must pass through the fan.

BUY A BETTER
INDUSTRIAL FAN
to do all these jobs:

1. Handle Air, Exhaust Fumes, Gases, Smoke
2. Remove Metal Dust, Chips, Sawdust, Grains
3. Convey Long, Fibrous Materials

Never before have you been able to find the combination of ruggedness, flexibility and high efficiencies now available in this new Industrial Fan. It has been designed for hard work—and *performs* on rough, tough industrial air handling jobs. It will help you to reduce operating costs by eliminating the manual or mechanical handling of many types of materials. It will help you to eliminate hazards and improve working conditions by exhausting fumes, dusts and vapors and performing many similar applications—all with a minimum of maintenance.

Here are ten top features which mean high efficiency, flexibility, and long life:


Streamlined inlet reduces losses caused by air turbulence, means new high efficiencies.
Sturdy welded fan housings eliminate air leakage, provide rigidity and eliminate vibration.
Fan wheels are of welded construction, with conical backplates for strength, and are statically and dynamically balanced.
Housings are convertible as to direction of discharge in all sizes. Inlet connection rings are in even inch sizes to accommodate standard sheet metal piping.
Extra heavy shafts maintain vibration-free operation. Cooling wheels and oil-lubricated ball bearings are provided for applications at elevated temperatures.
Available for belt or chain drives as well as direct-connected motor drive.
Large, heavy-duty, grease-lubricated ball bearings—one fixed, one floating—offset thrust and reduce maintenance.
Special protective coatings and special metals available to meet hazardous, explosive or corrosive conditions.
Wheels easily removed for cleaning and maintenance. Access doors also available for cleaning and inspection.
11 standard sizes with capacities ranging from 660 to 44,000 cfm and pressures up to 16" water gauge; also 5 additional "made-to-order" larger sizes for special requirements.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Centrifugal, Axial, and Propeller Fans adopted jointly by the National Association of Fan Manufacturers and the American Society of Heating and Ventilating Engineers.

AUTHORIZED BY N A F M

© NO NUMBER, ASSOCIATION OF FAN OFFICES

These Fans are certified under the NAFM Standard Test Code and carry the NAFM Certified Ratings Label.

Just off the press, Catalog 1150 gives you 60 pages of complete application information as well as performance and dimension tables for all sizes and wheel types. For your free copy, call your local Westinghouse-Sturtevant Office, or write Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.

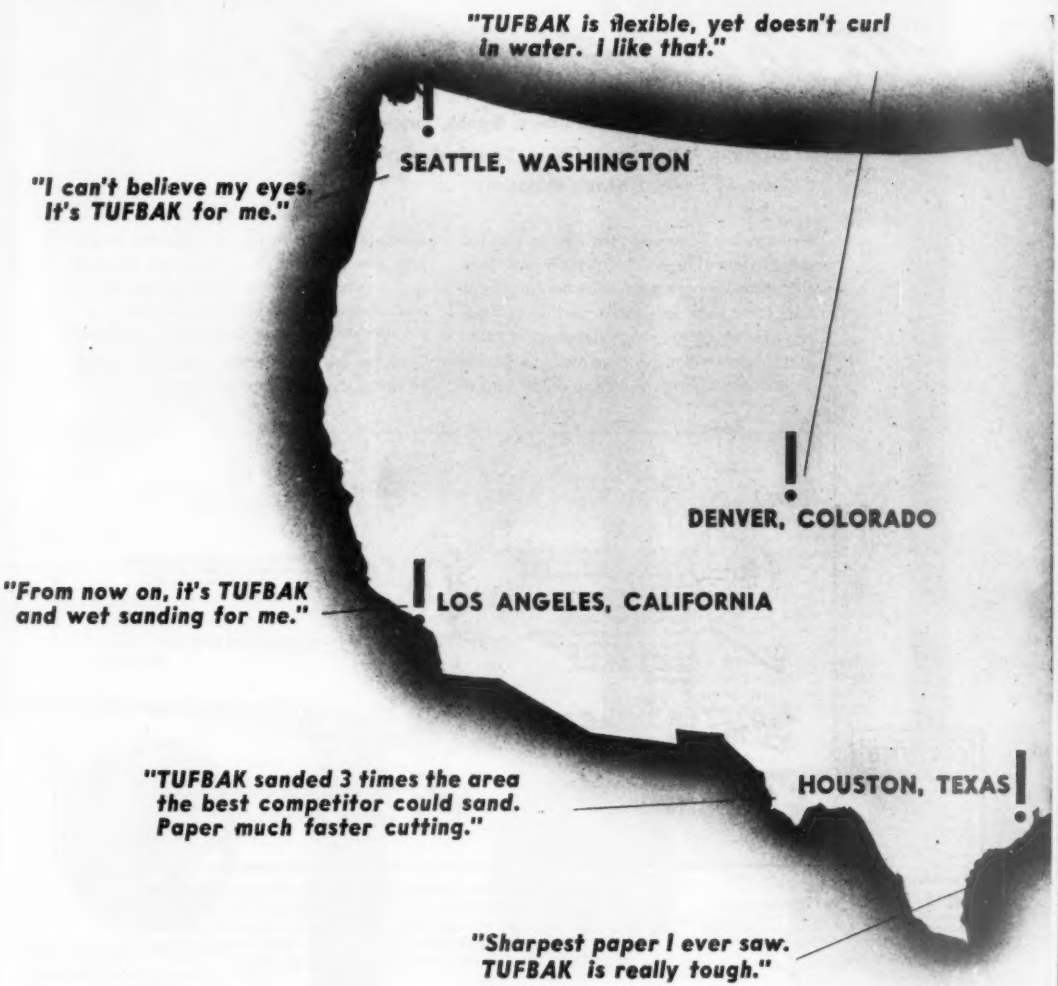
YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of political campaign over CBS television and radio.

AIR HANDLING

Coast-to-Coast AC

MOST REVOLUTIONARY WET


"TUFBAK is flexible, yet doesn't curl in water. I like that."
SEATTLE, WASHINGTON
"I can't believe my eyes. It's TUFBAK for me."
DENVER, COLORADO
"From now on, it's TUFBAK and wet sanding for me."
LOS ANGELES, CALIFORNIA
"TUFBAK sanded 3 times the area the best competitor could sand. Paper much faster cutting."
HOUSTON, TEXAS
"Sharpest paper I ever saw. TUFBAK is really tough."

CLAIM for TUFBAK
SANDING PAPER IN YEARS

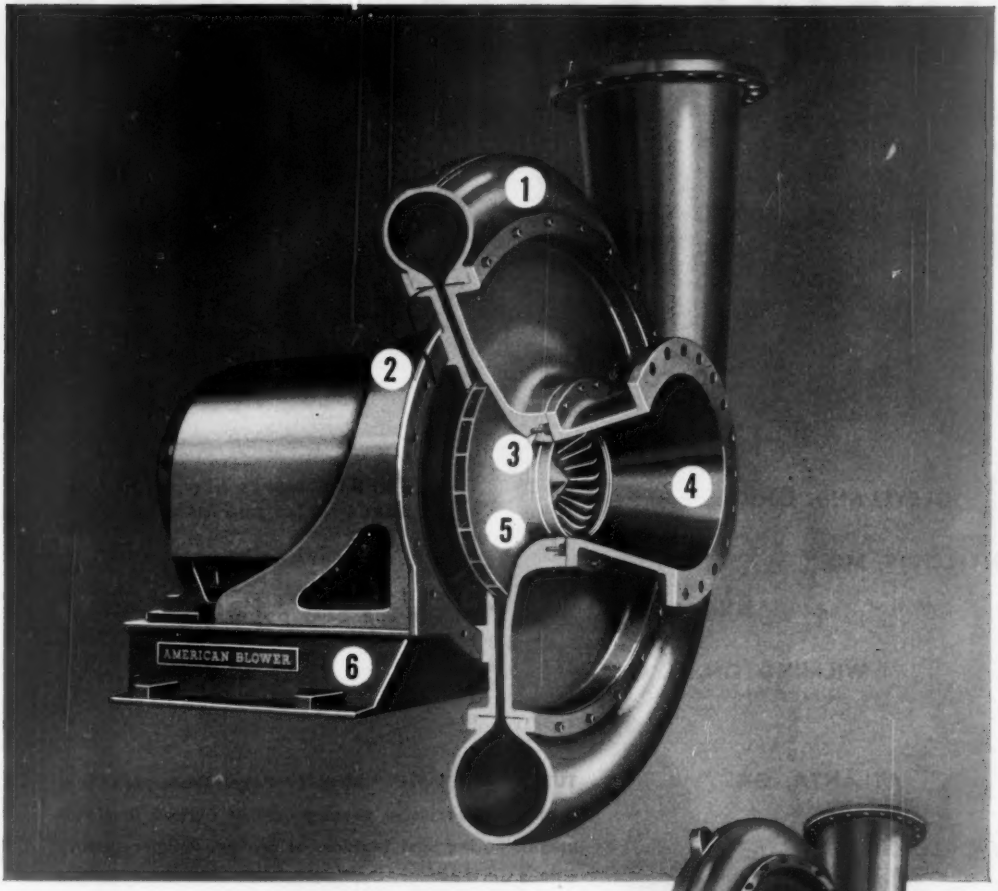
"The waterproof paper you just can't criticize."
BOSTON, MASS.
"So good, there just isn't any comparison."
CLEVELAND, OHIO
"TUFBAK works like magic. It sands faster and lasts longer."
SAINT LOUIS, MO.
"This is the best paper I have ever used."
WILMINGTON, N. C.
ATLANTA, GA.
NEW ORLEANS, LA.
"TUFBAK is the best waterproof paper on the market."

TUFBAK SPEED-WET® DURITE® Paper Waterproof is a brand new exclusive development of BEHR-MANNING combining the best features of proven, sharper-cutting silicon carbide abrasive grains with a stronger, better backing and new bonding techniques. For the fastest sanding job ever, try TUFBAK now. Order from your Distributor. Or, for further information write to Behr-Manning Corp., Troy, N. Y., Dept. FM-10.

BEHR-MANNING CORPORATION
division of NORTON Company

- COATED ABRASIVES
- SHARPENING STONES
- PRESSURE-SENSITIVE TAPES

American Blower... a great



In cutaway view above: (1) Improved scroll-shaped casing design results in increased compressor efficiency. (2) Unobstructed, long diffuser passage converts velocity energy into pressure; provides quiet operation. (3) Annulus packing minimizes recirculation of gas around impeller inlet. (4) Removable inlet nozzle assures accurate alignment of annulus packing when assembled with impeller. (5) Aero-dynamic design of impeller blades results in high efficiencies, long life. (6) Welded steel baseplate is "stress relieved" prior to machining—assuring maintained alignment.

name in air handling, *offers you*

An outstanding line of centrifugal compressors

Single stage design. Sizes from 30 to 600 HP.
Pressures from 1¼ to 3¾ lbs.

If your job calls for delivery of large volumes of air or gases, dependable American Blower Single Stage Centrifugal Compressors are just the ticket.

They're compact, require minimum foundations, are adaptable to all types of drives — electric motor, turbine or engine.

Except for the bearings, no other parts come in contact with each other — holding maintenance to an absolute minimum. Air or gases do not become contaminated since no internal lubrication is required.

Prior to shipment, each American Blower compressor is thoroughly tested in accordance with the A.S.M.E. Power Test Code for Centrifugal Compressors and Exhausters.

If you'd like complete, concise technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

AMERICAN **BLOWER**

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Is your present abrasive method

Only CARBO

TRADE

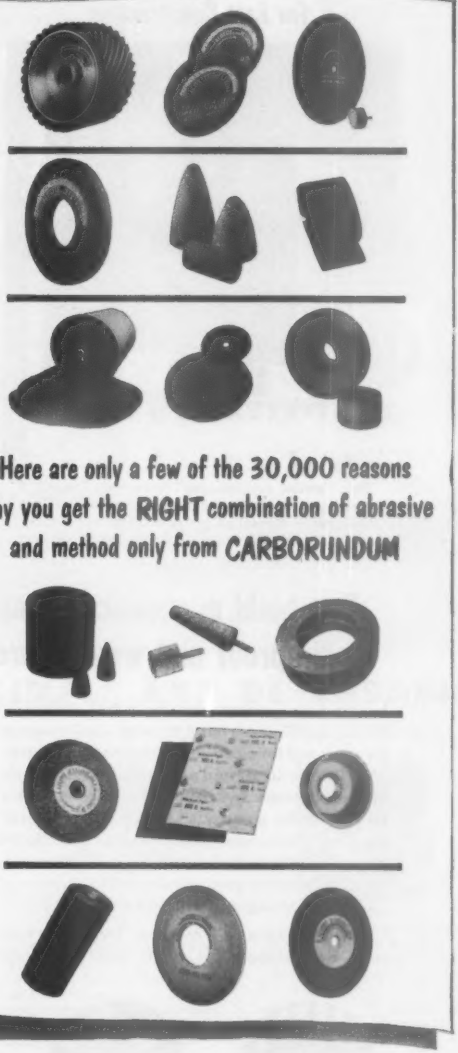
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, New York

really good enough, today?

Chances are good that if you've been using the same method for a mere two years, there's now a better way. That's how thick and fast the new developments in abrasive techniques have come along. Every day someone, somewhere, is switching from one method to another, under the pressure of one hard economic fact: the need to cut costs.

Here lies the biggest advantage to the shop which has standardized on abrasives by CARBORUNDUM. You get counsel free from bias, for the CARBORUNDUM distributor or salesman represents the only producer of a complete branded abrasives line, famous for uniform high quality. Thus he can recommend on the basis of what's most profitable for you, not just what's most profitable for him. And he can keep you posted on all the newest practices of metalworking shops from coast to coast.

Make a mental run-down today of each abrasive operation your shop performs, then call in the man from CARBORUNDUM for his experienced, practical, unbiased counsel. You'll find him listed in the yellow pages under "Abrasives." Call him today—it's to your profit!



Here are only a few of the 30,000 reasons why you get the RIGHT combination of abrasive and method only from CARBORUNDUM

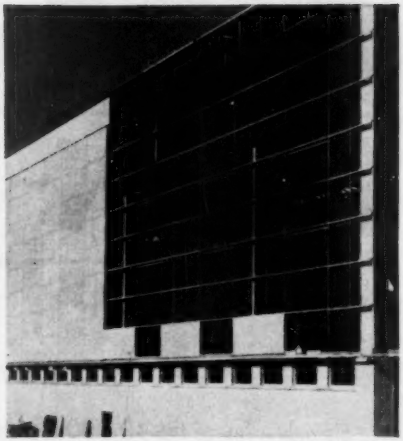
RUNDUM

MARK

offers ALL abrasive products...to give you the proper ONE

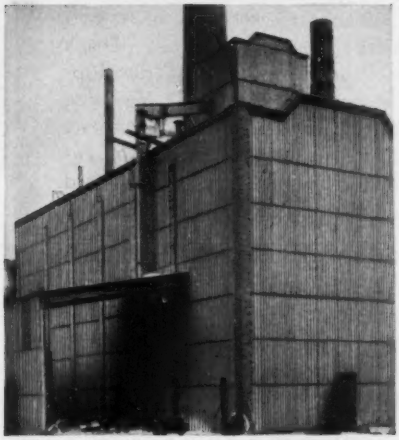
CORRUGATED *Asbestos* TRANSITE*

For Fast Construction



This "under construction" view of a recently completed aircraft plant clearly demonstrates how Johns-Manville Corrugated Transite goes up quickly and easily with a minimum of framing.

For Rugged Service



This railroad boiler house, built of rugged Johns-Manville Corrugated Transite, is still serviceable and presentable despite many years of heavy exposure to steam, smoke and soot.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof, needs no paint or special treatment to preserve it, and can be salvaged and re-used if necessary.

Today, Corrugated Asbestos Transite is also used increasingly for smart interiors... the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

• • •

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily... have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. FM, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Ontario.

*Reg. U. S. Pat. Off.

EASY TO FASTEN TO STEEL

EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

JM

Johns-Manville *Asbestos* **CORRUGATED TRANSITE**

Send for this 16-page Bulletin on Allen-Bradley Timing Relays

FOUR POPULAR TIMERS • SIMPLE AND DEPENDABLE

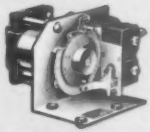
PNEUMATIC

Bulletin 849 pneumatic timing relay is a long life timer of high repetitive accuracy. Has an adjustable pneumatic bellows for regulating the tripping time. Time delay minimum—⅛ second; maximum—3 minutes. The operation of this pneumatic timer is easily changed from "on delay" to "off delay." A reliable, compact timer that is available in a wide variety of contact arrangements. It can be furnished in open type or in enclosures of various constructions.

FLUID DASHPOT

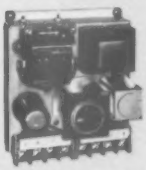
Bulletin 848 fluid dashpot timing relay is a low cost, adjustable timer for applications not requiring a high degree of accuracy, such as for timing electrically operated valves, motor starting sequences, etc. Time delay minimum—2 seconds; maximum—30 seconds. Single pole contacts, either normally open or normally closed. Silicone dashpot fluid assures consistent action at low ambient temperatures. Furnished in open type for panel mounting, or in pressed steel and cast iron enclosures for every service.

MOTOR DRIVEN



Bulletin 850 Style L motor driven timer is a precision switch of the maintained contact type. It alternately opens and closes two switch units 2, 3, 4, or 6 reversals per min. Ideal for controlling reversible machinery such as laundry washers or other processing equipment. Run and drift time easily adjusted. Silver alloy contacts.

ELECTRONIC



Bulletin 852 Electronic Timer has a thyratron tube used as a combination a-c rectifier and electronic switch. In 8 timing ranges from 0.025 sec. to 2 min. Accuracy 2% of setting. Ideal for machine tools, high frequency heating equipment, and photographic printing.

STANDARD ENCLOSURES FOR EVERY SERVICE

NEMA Type 1

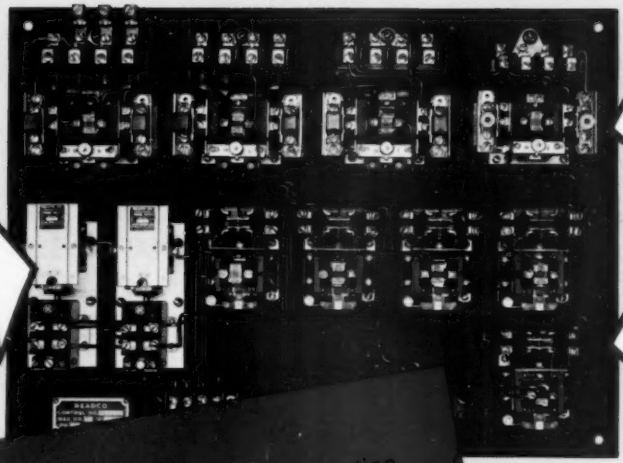
NEMA Type 4

NEMA Type 7

ALLEN-BRADLEY
QUALITY
TIMING RELAYS

A-B Quality

6-52—MR



CONTACTORS for Power Circuits

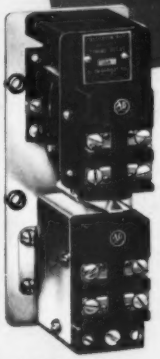
TIMING RELAYS for Sequence Control

RELAYS for Control Circuits

For Continuous Trouble Free Plant Operation

use ALLEN-BRADLEY RELAYS and CONTACTORS

NO CONTACT MAINTENANCE



Bulletin 849 Timer

Pneumatic timers adjustable ⅛ sec. to 3 min.

Various enclosures are available to meet any service requirements.

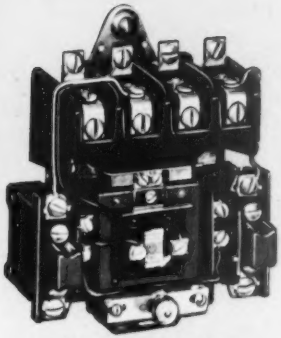
If you are laying out a new automatic manufacturing process, you can avoid costly operating shutdowns by using time tested controls . . . like Allen-Bradley trouble free relays, contactors, and switches.

Not only does the A-B trademark assure you of quality control units . . . with long, maintenance free life . . . but you will like the day in and day out consistency of their switching performance.

The variety of A-B units for handling interlocking or other special controls for manual, semiautomatic, or automatic operation will please you.

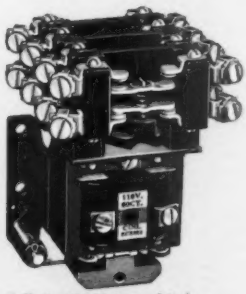
The compact Allen-Bradley handy catalog is a valuable reference guide in selecting the control components for any sequence control operation. We shall be glad to send you a copy.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.



Bulletin 709 Solenoid Switch

A compact across-the-line starter, with or without enclosures, in eight sizes. Thermal relays give reliable overload protection.



Bulletin 700 Universal Relay

With four N.O. and four N.C. contacts. Good for millions of operations.

A-B Quality

ALLEN-BRADLEY

RELAYS & CONTACTORS

QUALITY

6-52—M

Dearborn Check-Chart will help you protect against rust!

Day and night, every minute of every hour, metal-hungry rust is destroying your valuable plant and equipment. You can protect metal surfaces now if you follow the simple Dearborn Plant Maintenance Survey.

With the Check-Chart as a guide, you can easily flag danger points where rust threatens—tanks, stacks, gutters, boilers and all metal surfaces throughout the plant. A NO-OX-ID coating, applied to these exposed metal surfaces will eliminate costly, time consuming repairs, save hard-to-get, valuable materials.

Then, a simplified maintenance program will keep plant and equipment rust free . . . prevent costly production delays . . . wasted man-hours. A Dearborn representative will assist in selecting the correct NO-OX-ID to meet your requirements.

WRITE FOR YOUR COPY

Dearborn has prepared this helpful guide to money-saving maintenance as a service to all industry. Your Check-Chart and NO-OX-ID Plant Maintenance Survey will be furnished—without cost. The coupon is for your convenience.

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Merchandise Mart Plaza • Chicago 54, Illinois

Dearborn
Reg. U. S. Pat. Off.

NO-OX-ID
IRON RUST

THE ORIGINAL RUST PREVENTIVE

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza, Dept. F
Chicago 54, Illinois

Gentlemen:

☐ Please send my copy of the Dearborn Plant Maintenance Survey.

☐ Have a Dearborn representative call.

Name.....

Company.....

Address.....

City.....*Zone*.....*State*.....

industry's New work

National Electric "Plug-In" Busway and "Lo-Loss" Feeder Busway... The only busways with such rugged construction!

National Electric Busways are especially designed to meet the rugged requirements of American industry. They offer the most economical, convenient, flexible and salvable layout possible for industrial or commercial installations. Check these *money-saving* "workhorse" features:

TOUGH—National Electric busway incorporates a heavy 12 gauge steel channel to independently support and protect the insulator.

EFFICIENT—With "Lo-Loss" Busway, voltage drop is less than 2.2 volts per 100 feet for a concentrated load. Where the load is distributed, the voltage drop is approximately 1 volt per 100 ft.

FLEXIBLE—"Lo-Loss" is approved by Underwriters' Laboratories for horizontal or vertical mounting.

CONVENIENT—Factory fabricated sections go up *quick*. With "Plug-In" Busway, machinery can be "plugged-in" anytime without shutting down the production line. Especially convenient for congested areas.

Approved by the Underwriters' Laboratories, Inc.

"PLUG-IN" BUSWAY

- Rolled Edge Copper Bus Bars.
- All Bus Bar Joints are electro-silver-plated and have a heavy coat of silver.
- Simplified, fool-proof, sliding type "Plug-In" opening covers. No removable parts or springs.
- Neutral gray finish baked to a hard surface inside and out.
- Insulators supported in a sturdy 12 gauge steel channel frame withstand rough handling during shipment.

"LO-LOSS" FEEDER BUSWAY

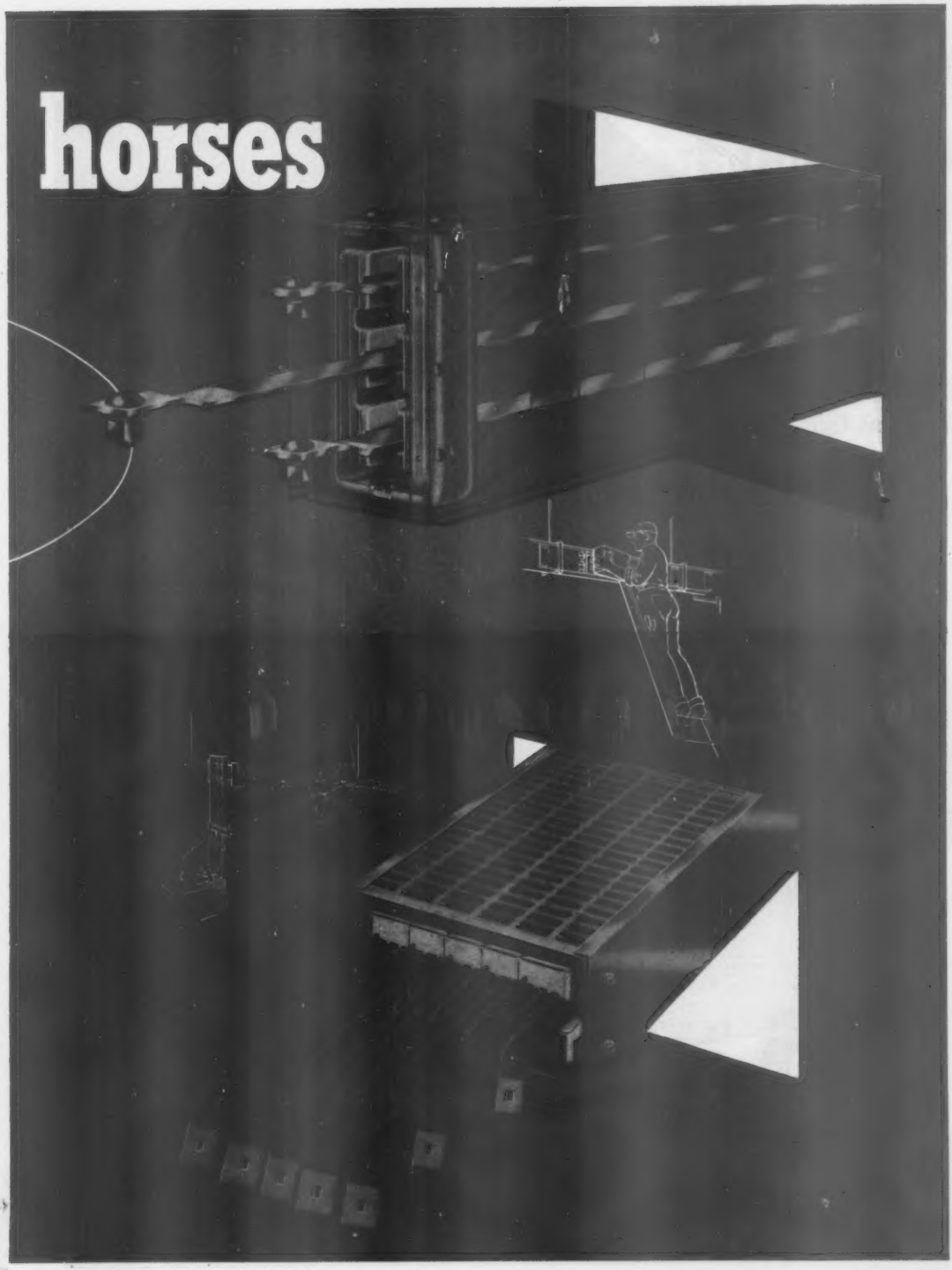
- "Lo-Loss" Feeder Busway is economical and efficient for conducting long runs of alternating current where voltage drop must be kept to a minimum. It is easy to install because single bolt contacts are used when joining sections.
- "Lo-Loss" Feeder Busway is designed for transmission of electrical current up to 4000 Amperes at 600 Volts or less.

EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 PLANTS • 7 WAREHOUSES
42 SALES OFFICES


horses

HERE'S SIMPLE ARITHMETIC on PREFABS:

PREFAB BUILDING +
TRAMRAIL CRANE =

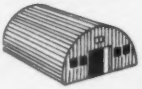
1 Low Cost
2 Good Construction
3 Efficient
Overhead
Materials
Handling

Butler Prefabricated Buildings are especially well suited for overhead cranes. Their cross-section makes it possible for a crane to span the entire width and provide service for all of the floor area. Their sturdy construction enables them to support heavy loads. The Cleveland Tramrail crane here is hand-propelled with chain hoist. It has 4000 lbs. capacity. The building is 40' x 100'.

Do you need a building for warehousing or manufacturing? One at low cost? Of good durable construction? Equipped with overhead materials handling facility? Then look into prefabricated metal buildings provided with a Cleveland Tramrail Crane. This combination has proven to be economical and efficient for a number of companies.

Prefabs will usually support crane loads from 1000 to 6000 lbs. depending upon type and size building. They can be made any length and by joining units can be made of various widths.

Hand-propelled cranes with electric hoists are generally most practical in prefabs. Because Cleveland Tramrail cranes and carriers roll so easily, very little effort is required to propel them manually. While chain hoists are satisfactory, but slow, most users find electric hoists desirable to do the heavy lifting.



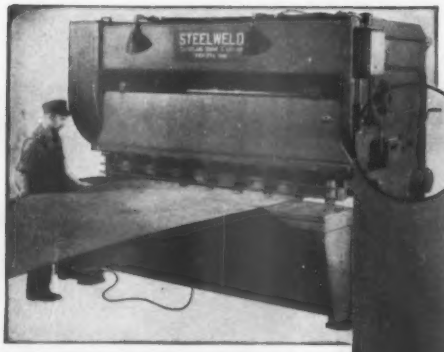
Cleveland Tramrail cranes have proven satisfactory in quonset buildings. This 40' x 100' building, erected in 1947, has a crane runway 19' above the floor. The 24 ft. span crane is hand-propelled with electric hoist. Capacity is 2000 lbs.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3271 EAST 284TH STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



THE *Right* KNIFE CLEARANCE FOR EVERY PLATE THICKNESS

ONLY STEELWELD SHEARS HAVE THIS SIMPLE KNIFE ADJUSTMENT

It is simple, fast and easy to adjust the knife clearance on a Steelweld Pivoted-Blade Shear to suit every plate thickness. No bolts to loosen! No bed to move! No feeler gauges required!

Only turn a crank and watch a dial. That's all there is to it. The large easily-read dial indicates the clearance between knives in thousandths of an inch and also shows the plate thickness that may be cut with any knife setting. Because of the ease with which knife adjustments are made, every cut made on Steelweld Shears is the best cut possible—straight, smooth, accurate. And of importance, knives remain sharper for longer periods.

Steelweld Shears are built for thicknesses of 12 gauge to 1¼ inch and for lengths of 6 to 18 feet.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

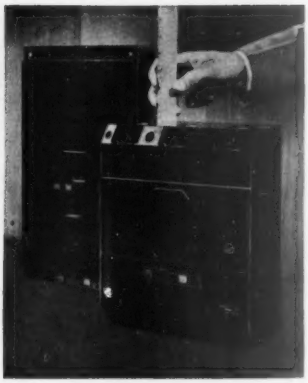
THE CLEVELAND CRANE & ENGINEERING CO.

3211 EAST 282ND STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

I-T-E announces 4 new circuit breakers

Conference following announcement of four new I-T-E panelboard circuit breaker designs. J. E. Kleinfelder, left, Sales Manager of the Small Air Circuit Breaker Division, listens as W. H. Edmunds, Engineer in Charge, explains the operating advantages of externally-adjustable instantaneous trip feature. Each of the four new breakers was designed specifically to improve construction and operation of panelboard and load center assemblies.

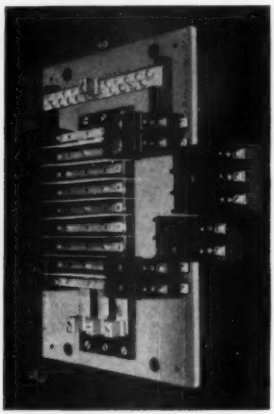


SAVES SPACE

Both I-T-E breakers are rated 225 amperes. New "J" frame, right, is 4½ inches shorter than present "K" frame. Benefits of this new design will be reflected in compact distribution-type panelboards and combination motor starter enclosures.

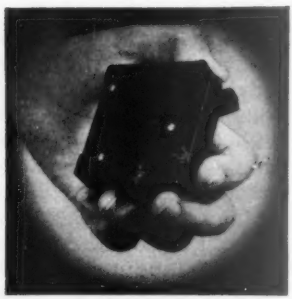
DOUBLES CAPACITY

Small lighting and distribution-type panelboard construction, previously limited to 50 ampere breaker capacity, may now incorporate 100 ampere branch circuits. New I-T-E "E" frame breaker, left, now has the same capacity as the "F" frame breaker shown above. New "E" frame will be advantageously applied up to 250 volts a-c wherever space conservation is required.



FIRST 2- AND 3-POLE EQ

New multipole EQ-type breakers are exact multiples of present single-pole design. Any given number of poles take the same space in panelboard. No tie-bar arrangements are necessary; all poles operate on common trip.



TINY, NEW EQP

This small, new single-pole EQP breaker now provides more compact plug-in lighting panelboards with all the features of I-T-E quality construction.

YOU STAY YEARS AHEAD WHEN YOU SPECIFY . . .

LOOK FOR RADICAL IMPROVEMENTS IN PANELBOARD AND LOAD CENTER DESIGN

Sweeping new improvements in the construction and reliability of future panelboards and load centers can now be expected, with introduction of four new circuit breaker designs developed by the I-T-E Circuit Breaker Company.

Three of the new units are advanced modifications of proved I-T-E designs in the 50, 100, and 225 ampere ratings. The fourth unit, a new, smaller addition to the present line of I-T-E molded case circuit breakers, is specifically designed for use in lighting panelboard and load center applications.

MORE COMPACT DISTRIBUTION-TYPE PANELBOARDS

Panelboards housing two 225 ampere breakers are shortened 9 inches, as result of a 4½-inch decrease in height of the present I-T-E "K" frame breaker. This size reduction now makes it possible to double-butt two of these new, short "J" frame breakers in the same vertical space formerly required for the one larger unit. The width of one whole breaker (9 inches) is saved.

SMALLER COMBINATION STARTERS

Motor-starting-equipment enclosures, using a circuit breaker in combination, can now be reduced as much as 4½ inches in height. I-T-E 225 and 100 ampere breakers have been shortened accordingly, without sacrificing electrical clearances or current-carrying capacities.

NOW... LIGHTING- AND DISTRIBUTION-TYPE PANELBOARDS UP TO 100 AMPERES

Where combination lighting and power panelboards were formerly limited to 50 ampere branch circuit ratings, the same type panelboard can now be obtained with 100 ampere capacity branch circuits. Redesign of the I-T-E "E" frame breaker doubles its current rating to 100 amperes at 250 volts a-c.

Also included in this "E" frame revision are 15 and 20 ampere ratings for fluorescent lighting applications at 277 volts a-c.

SIMPLIFIED MULTIPOLE PANELBOARDS

Compactness of multipole 50 ampere panelboards is improved and installation simplified through use of the new I-T-E two- and three-pole EQ breakers. First of their type available anywhere, these new multipole breakers fit all existing panelboard and load center designs in which single-pole breakers were formerly used. No tie-bar arrangements are necessary; all poles operate on common trip.

SMALLER PLUG-IN TYPE LIGHTING PANELBOARDS

Compact lighting panelboards and load centers for residential and commercial service can now incorporate all the advantages of I-T-E quality circuit breaker protection. The new, small I-T-E single-pole EQP design which makes this possible provides quick-make, quick-break operation and convenient plug-in feature.

ONE MANUFACTURER'S BREAKERS THROUGHOUT

Plant and operating engineers, electrical contractors, and electricians desiring uniformity of construction and components throughout their secondary distribution systems can now specify the largest variety of molded case circuit breakers for all applications up to 600 amperes, 600 volts a-c, 250 volts d-c. Frame sizes and types are available to suit any residential, commercial, or industrial requirement.

Standardize on I-T-E circuit breakers to assure service continuity, simplified maintenance, a single source for system expansion or replacements, and—*always*—the same, proved I-T-E dependability throughout.

FULL DETAILS AVAILABLE FROM YOUR LOCAL PANELBOARD BUILDER

I-T-E

MOLDED CASE CIRCUIT BREAKERS

I-T-E CIRCUIT BREAKER COMPANY • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

Canadian Mfg. and Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., N.Y. 17, N.Y.

Machine Against Muscle

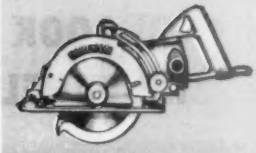
THE STORY OF WHY A FAMOUS COMPANY SEES FIT TO TAKE A NEW NAME

In 1924 the dream of a man named Joseph W. Sullivan was realized in a revolutionary new tool that was to take the industrial world by storm. The portable power saw was born and a young company was off to a flying start.

Inevitably, the success of this new power tool attracted imitators, brought others to the field. In spite of this, Skilsaw, Inc., maintained a leadership which continues to keep it *first* in the field.

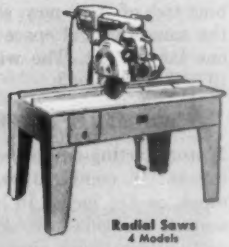
With this remarkable growth came stronger and stronger demand from *all* industry for *other* kinds of power tools built with SKIL Quality, *other* ways to replace muscle with machine and do jobs better, with less work in less time. Skilsaw, Inc., has answered this demand—now offers more than 160 different models of portable power tools, each one an example of the finest engineering and quality in the field—SKIL Quality!

So it is with justifiable pride that we now alter a corporate name we have in simple fact outgrown. Hereafter, the company long known as Skilsaw, Inc., will be known as SKIL Corporation, the name to be remembered in the manufacture, sale and service of portable power tools.

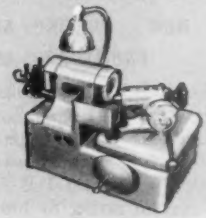


Saws
10 Models

Belt Sanders
5 Models



Radial Saws
4 Models



Valve Refacers
3 Models

Saws
4 Models

SKIL Corporation

formerly SKILSAW, Inc.

5033 ELSTON AVENUE, CHICAGO 30, ILLINOIS

BOTH SKIL AND SKILSAW WILL CONTINUE TO BE USED AS TRADEMARKS

SKIL PORTABLE TOOLS

Drills
26 Models

Plane
1 Model

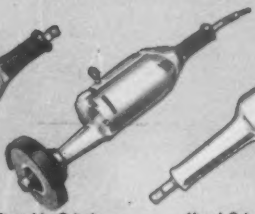
Bench Grinders
7 Models

BESIDES SAWS . . . 26 OTHER TOOLS AND

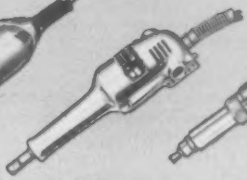
Oscillating Sander
1 Model

Floor Sanders
2 Models

Disc Sanders
6 Models



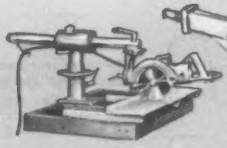
Portable Grinders
5 Models



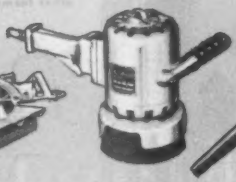
Hand Grinders
3 Models

Drivers and Runners
20 Models

MORE THAN 150 DIFFERENT MODELS



Radial Supports
3 Models

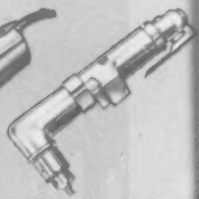


Polyphase Grinder
1 Model

Blowers
5 Models

Electric Hammer
1 Model

Shears
1 Model



Pneumatic Right Angle Drills & Drivers
6 Models

FOR EVERY INDUSTRY

Valve Seat Grinders
2 Models

Automobile Polishers
2 Models

Valve Seat Grinder Sets
4 Models

Pneumatic Hammers
12 Models

Pneumatic Drills
7 Models

Pneumatic Drivers and Runners
12 Models

Pneumatic Sanders and Polishers
2 Models

INCLUDING THESE SKIL HOME SHOP TOOLS

Belt Sander
1 Model

¼" Drills
2 Models

½" Drills
2 Models

Kits
3 Models

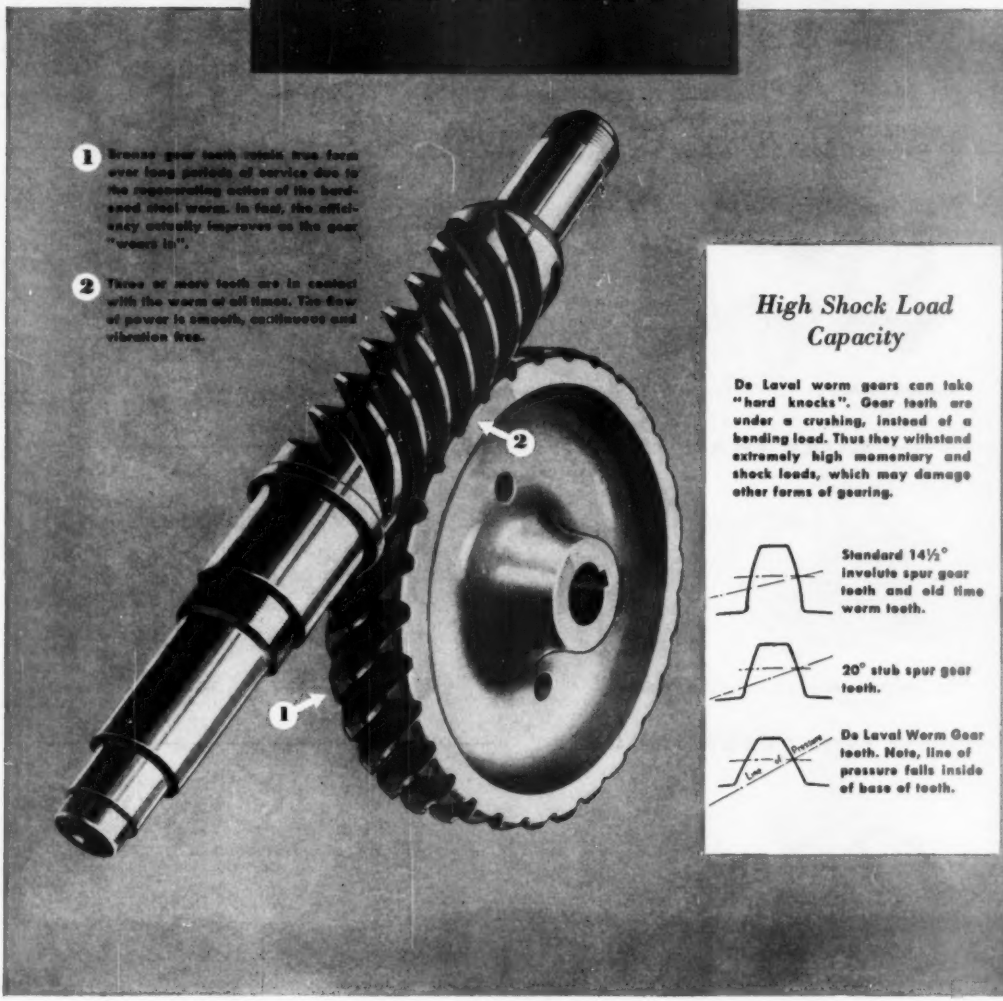
Sander Polisher
1 Model

Oscillating Sander
1 Model

Hedge Trimmer
1 Model

DE LAVAL WORM GEARING

precision-


1 Bronze gear teeth remain true form over long periods of service due to the reconditioning action of the hardened steel worm. In fact, the efficiency actually improves as the gear "wears in".
2 Three or more teeth are in contact with the worm at all times. The flow of power is smooth, continuous and vibration free.
1
2

High Shock Load Capacity

De Laval worm gears can take "hard knocks". Gear teeth are under a crushing, instead of a bending load. Thus they withstand extremely high momentary and shock loads, which may damage other forms of gearing.

Standard 14½° involute spur gear tooth and old time worm tooth.

20° stub spur gear tooth.

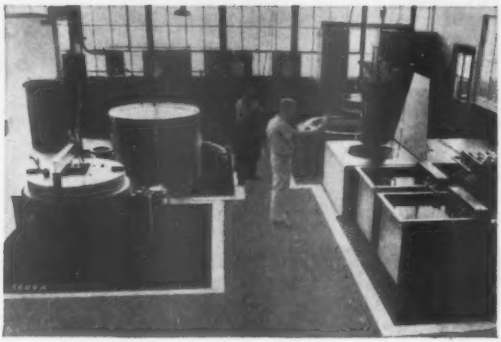
De Laval Worm Gear tooth. Note, line of pressure falls inside of base of tooth.

For high productivity, the machine of the future must perform dependably, without breakdowns, with minimum maintenance. The design features shown above explain why De Laval heavy-duty worm gear speed reducers take punishment year-in, year-out . . . seldom require attention even under the most rugged operating conditions. They make a close-coupled, compact drive. High ratio reduction permits use of efficient, high-speed motors and turbines for driving many types of industrial machinery. De Laval builds all sizes, too . . . from 3″ to 30″ center distances for every type of application. Whatever you manufacture—if you use speed reducers—remember that De Laval Speed Reducers are . . . BUILT TO BE BUILT-INTO A QUALITY PRODUCT.

FREE Easy Selection Manuals

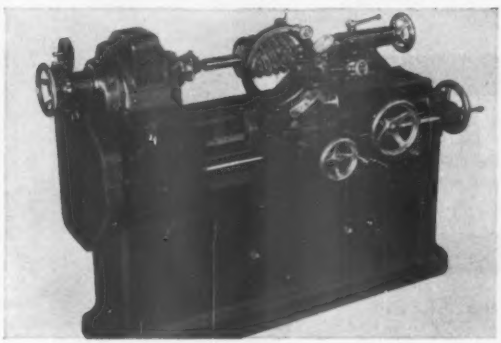
New De Laval Manuals G-WBV and G-WWH place at your fingertips valuable data on single and double reduction units. They contain complete selection data, hp rating tables and outline drawings . . . all set up in easy-to-use form. Write for your copies.

made for the machine of the future



HEAT TREATMENT INCREASES WORM LIFE! Carefully selected alloy steel for worms is surface-hardened and heat-treated in controlled atmosphere, forced convection electric furnaces under modern metallurgical inspection and control. This heat treatment provides hard thread surfaces and most desirable core properties.

PRECISION GRINDING ASSURES ACCURATE THREADS! The most modern thread grinding machines available leave nothing to chance at De Laval. To obtain perfect contact between worm and gear, threads of worm are ground to correct lead and contour, using the master worm as a reference. Thousands of installations have proved these quality standards.



HOBS AND WORMS ARE PRECISION-CHECKED! The profile of the worm thread is compared directly with the master worm on this specially designed machine. This insures smooth, quiet, efficient operation. Use of De Laval master worms results in uniformity, correct thread thickness, precise tooth contour and interchangeability of parts.

GEARS ARE HOBBED BY TANGENTIAL FEED PROCESS! In De Laval gears, the teeth are generated in bronze gear blanks by the tangential feed process, recognized as the most satisfactory method of producing worm gears. Hobs are designed and manufactured by De Laval to secure close control of quality, dimension and form.

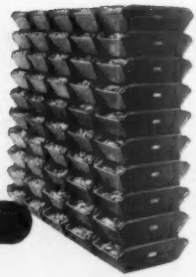
DE LAVAL *Speed Reducers*

DE LAVAL STEAM TURBINE COMPANY
804 Nottingham Way, Trenton 2, New Jersey

DL.148

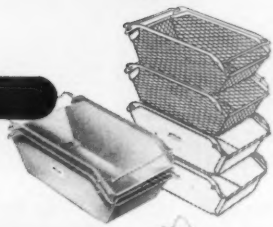
STANDARD BOXES *for* SPECIAL JOBS!

No matter what business you are in—or what problems you have in handling small parts, there is a standard NesTier custom-made to fit your requirements. A production line product, the NesTier effects savings in initial cost as well as on the job—from stock room to loading dock.



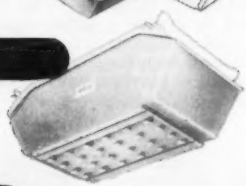
STOCK ROOM OR STORAGE

Nowhere else will you find a box that will serve alone as a permanent stock room fixture. No racks are necessary as tiered units lock themselves together to form rigid stacks. Parts in all units are visible and accessible.



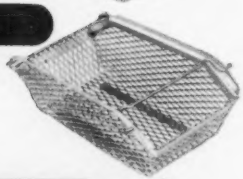
PRODUCTION

NesTiers were designed primarily for production line work. Empty, they nest to save space. Filled and tiered, they lock together with contents of all units visible and accessible. Filled or empty, they are easily transported by truck, roller or overhead conveyor—even by hand.



DRAINAGE

Here is the standard one-piece sheet steel NesTier with a lanced bottom that permits rapid drainage of contents without allowing even the smallest parts to slip through. No need to transfer parts requiring drainage when this box is used.



DEGREASING

The necessity to change boxes for any cleaning, dipping or degreasing operation has been eliminated with this NesTier expanded metal basket. Formed in the distinctive NesTier shape, this unit is as rugged as the solid sheet steel box and retains all of the outstanding NesTier features.

PROTECTION

NesTier fibre inserts actually perform two functions. Parts are protected against damage from metal box and a variety of parts may be placed in one box without becoming mixed. Furnished with or without dividers.

SHIPPING

The NesTier one-piece "snap on" lid keeps parts from jouncing out while being transported through the plant or from plant to plant. Filled units with lids attached can be tiered, allowing parts to be stored or transported and yet keep clean.

NesTiers are formed of one-piece sheet steel, with or without lanced bottom; zinc plated expanded metal, galvanized, stainless steel or aluminum. All units and accessories interchangeable. Two standard sizes.

NESTIER
IT NESTS - IT TIERS

THE CHAS. Wm. DOEPKE MANUFACTURING CO., INC.
METAL SPECIALTIES DIVISION ROSSMOYNE, OHIO

How to buy A FORK TRUCK that will really reduce your handling costs

THE RIGHT WAY to select a fork truck is to make an honest comparison of types and makes.

GAS OR ELECTRIC?

Unless your operating conditions are unusual, you can enjoy the inherent advantages and economies of *Electric* fork trucks: 3 times longer life, ⅓ the operating cost of gas, no fumes, no noise, smoother power flow.

WHICH MAKE OF ELECTRIC?

A factual comparison will show that Lewis-Shepard Spacemaster Electric Fork Trucks give you more of the features you want, the quality you need, and the savings you expect.

1. **Greater Dependability** — less routine maintenance.
2. **Operate in Less Space** — compact design and smaller turning radius.
3. **Greater Speed** — more powerful traction motor, faster lift motor.
4. **Safer Reverse Operation** — with Standrive.
5. **Full Free Lift** — essential where headroom is limited.
6. **Smoother, Timed Acceleration** — with Magnetic Controls.
7. **99% of Foot Braking Eliminated** — with dynamic braking.
8. **No Grease Points** — sealed ball bearings.
9. **Absolutely No Under Truck Adjustments** — all maintenance from topside.
10. **Maximum Stability** — lowest center of gravity.

LEWIS-SHEPARD

Nation-wide Service — See "Trucks, Industrial" in your Yellow Phone Book

The "MASTER" Line

TO HELP YOU BASE YOUR DECISION ON FACTS

Get this handy "Fork Truck Comparison Chart". It permits you to quickly make your own graphic, unbiased comparison. Lists buying "guides" . . . lets you evaluate the comparative merits of each manufacturer's trucks. Write for it now.

Lewis-Shepard Products, Inc.
16 Walnut St., Watertown 72, Mass.

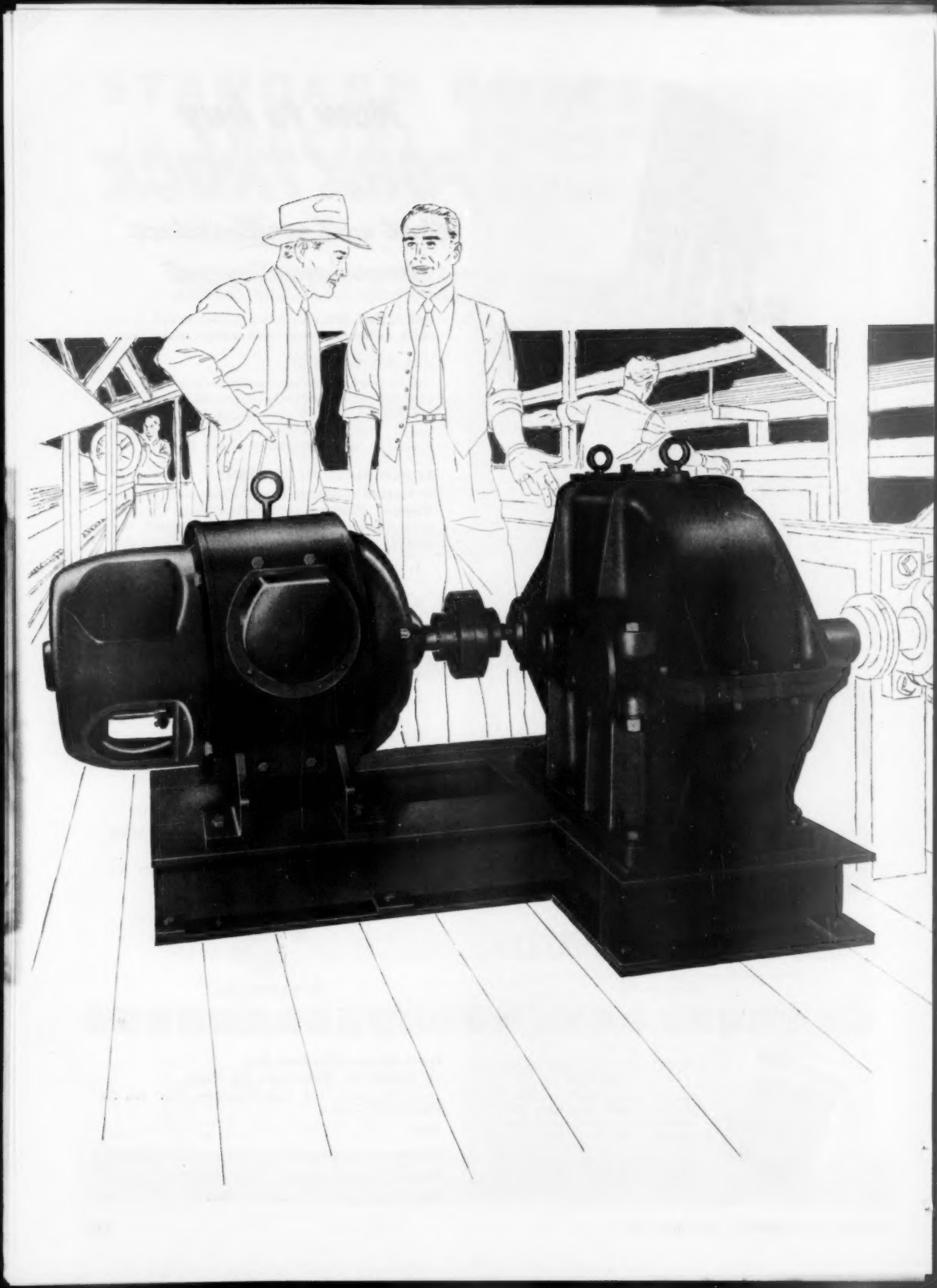
Please send me a "Fork Truck Comparison Chart" and the SPACEMASTER Catalog.

Name.....

Company.....

Street.....

City.....State.....



"I'll tell you why we buy these Westinghouse Drive Teams"

"We obtain exclusive benefits from the planning stage right on through the long life of the drive. You see, experienced Westinghouse Application Engineers know both mechanical and electrical drive problems. When we put our heads together, we always come up with a better drive solution.

"We also benefit every step of the way from ordering to maintenance because there's only one point of contact required—undivided responsibility. Westinghouse ability and willingness to handle our complete drive requirements sure saves us plenty of headaches. Saves our time and dollars, too.

"Experience has shown us that we can depend on a Westinghouse Speed Reducer. The taper-hardened, accurately hobbed gears, the rugged tight case, the efficient roller bearings, the positive lubrication system—all add up to a speed reducer that is second to none.

"The Life-Line d-c motor deserves its share of the credit, too. The features we especially like are the pre-lubricated bearings and the all-steel construction. We install a Life-Line motor and forget it."

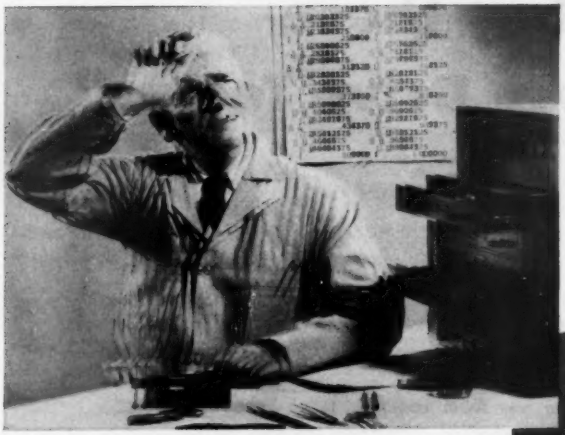
The next time you have a drive problem, call in your Westinghouse representative. Remember—Westinghouse makes the complete drive.

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.
J-07307

YOU CAN BE SURE...IF IT'S Westinghouse

Life-Line MOTORS AND SPEED REDUCERS

STOP annoying blink...blink...blink



WITH WATCH DOG NO-BLINK FLUORESCENT STARTERS

Annoying fluorescent blink and excessive maintenance go hand in hand. Here's what Watch Dog* starters do about it.

- Watch Dog starters *stop blinking* by automatically turning off a failing fluorescent lamp.
- Watch Dog starters *keep the lamp off* until the red reset button is pushed when new lamp is installed. No recurring blinking every time the lights are turned on.
- Watch Dog no-blink starters *outlast* ordinary starters by as much as 10 to 1. Ballasts last longer, too.

You can stop the annoying blink of worn-out fluorescent lamps—cut starter replacement costs—cut ballast replacement costs—by seeing that *all* your fluorescent fixtures are equipped with General Electric Watch Dog no-blink starters.

Specify Watch Dog starters for new fixtures—insist on them for replacement. For a copy of folder Q33-1034, which gives all the facts on the Watch Dog starter line, write Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

For all replacement needs—use the famous Watch Dog no-blink starter with the red reset button.

And here is the tag to look for when you buy fluorescent fixtures. It is your guarantee that the fixture has been equipped with G-E Watch Dog no-blink starters.

This Handsome Floor
is no sissy, mister!

...Flexachrome floors are tough, rugged, long wearing, grease and oil resistant!

Sure, Flexachrome's *good looking!* Yes . . . *beautiful!*

But don't hold *that* against it.

Flexachrome* Vinyl Plastic-Asbestos Floor Tile is *all-man*, Mister . . . all-man *all the way through.*

Let's list Flexachrome's advantages . . . it is moderately priced. It is quickly installed . . . no long space tie-ups. It can take all that "the traffic will bear." Standing feet . . . Walking feet . . . Light trucks . . . Heavy trucks.

Maintenance is simple. Daily sweeping . . . periodic washing. Repairs are quick and inexpensive . . . thanks to tile-at-a-time installation.

Flexachrome is unharmed by vegetable and mineral oils . . . and greases. It's ideal in machine areas, food packing departments, kitchens, cafeterias, laboratories.

So, *in addition* to a rich choice of colors with high light reflectance that improve working environment and boost employee morale... Flexachrome gives you: *first low cost . . . low operating cost . . . long service life.*

Phone your local Tile-Tex* Contractor, listed in your classified telephone book. Ask him to show you samples of TUFF-TEX*, too . . . another colorful, economical, greaseproof flooring material.

THE TILE-TEX DIVISION, The Flintkote Company, 1234 McKinley Street, Chicago Heights, Illinois.

TILE-TEX—THE PIONEER DIVISION, The Flintkote Company, P. O. Box 2218, Terminal Annex, Los Angeles 54, California.

The Flintkote Company of Canada, Ltd., 30th Street, Long Branch, Toronto, Canada.

Tile-Tex
PLASTIC-ASBESTOS
FLOORS AND WALLS

*Registered Trademark, The Flintkote Company

Are YOU risking fires like these?

A PROPERTY-CONSUMING FIRE resulted above when *full* fire protection was not provided for this rubber manufacturing plant. If you are responsible for protecting life and property, you can make sure of *full* fire protection by installing a carefully engineered alarm or release system that incorporates Fenwal DETECT-A-FIRE® thermostats.

A $3,000,000 FIRE occurred at this boarding school. It could have been quickly detected by Fenwal DETECT-A-FIRE thermostats activating an alarm or release fire protection system. These thermostats respond the instant temperature of surrounding air reaches danger point! No hazardous delays! No annoying false alarms! No other fire detection units are so positive.

A MONEY-SAVING ECONOMY is still another benefit to users of DETECT-A-FIRE thermostats. Besides cutting loss of life and property, these thermostats assure long-term economy in themselves. They offer built-in extra value by combining long life, corrosion resistance and repeatability. Fenwal DETECT-A-FIRE thermostats are listed by (UL) . . . approved by (FM).

THESE FREE BULLETINS give you complete details on Fenwal DETECT-A-FIRE thermostats and their new Rate-Compensation Actuation principle of fire detection. They are the only units operating on this principle. Fenwal engineers will be glad to work with you and your system installer in bringing you *full* fire protection. Write Fenwal, Incorporated, 610 Pleasant Street, Ashland, Mass.

Fenwal

DETECT-A-FIRE®

Thermostats

DYNAMIC, RATE-COMPENSATION ACTUATED FIRE DETECTORS

The main end slide of a 3½-SIX figures prominently in producing the above piece. Its total length is 34½ ins. Its diameter is 12 ins. Its swing for die heads, etc., is 4 ins. The maximum recommended load for the slide is 12,000 foot pounds. Its bearing area is approx. 258 sq. ins.

Front Side of Tooling Area

BETTER BEFORE THAN AFTER

Rear Side of Tooling Area

What an "automatic" does *after* it goes into production is information for which you have already paid a purchase price. How much more you will pay for operation and maintenance costs will determine the completeness and dependability of that information.

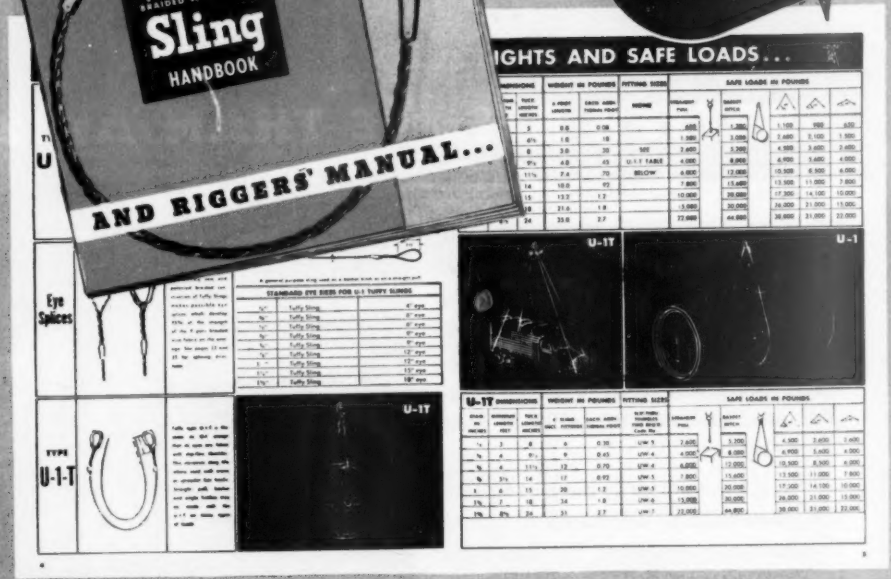
It is always better to have complete and dependable information *before* the purchase than after. You can have it on CONOMATICS.

A Comparison of ALL Automatics is in favor of Cone

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Just Off to Help

Free!



union Wire Rope

the Press and Ready You Cut Sling Costs!

Only Handbook of its Kind in the Sling Field. You just can't measure Tuffy Slings by the old sling standards. Because of the new characteristics and efficiencies developed in Tuffy's 9 part, machine braided wire fabric construction, all users of slings need this Sling Handbook to know the facts about lower sling costs through longer sling service. You can have it FREE for the asking. It gives you—

Factual Data On 12 Sling Types and On Various Types of Sling Fittings. That's right, all the working data—dimensions, weights, safe loads, standard eye sizes, tuck lengths, sizes and data on standard and special fittings, straight pull, basket, choker and angle hitches, simplified ordering procedure, etc., on 12 factory fitted and factory packaged sling types. Also there is valuable information on sling care and on braided wire fabric for rigging your own slings.

30 Illustrations of Sling Uses—help you determine the types to fit your sling jobs. Should none of the 12 factory fitted types exactly fit, then the handbook tells how our engineers develop special types for special uses.

Step by Step, Illustrated Instructions On Splicing Both Tuffy Slings and Wire Rope. Splicing the braided wire fabric of Tuffy Slings is made easy with visual instructions. And, to make the sling handbook doubly useful, it contains 24 pages of visual instructions on making 7 kinds of wire rope splices, attaching sockets, ferrules and thimble clamp. Efficiencies of wire rope attachments, as established by actual strength tests, are tabulated.

You'll find this Sling Handbook and Riggers Manual easy to use and highly useful. A copy is yours with our compliments. Simply fill out and send the coupon.

Tie a knot in a Tuffy Sling. Note its flexibility. Pull the knot tight—then untie it. See how readily the patented braided fabric straightens out again.

It's hard to do by hand without the aid of a vise. If you are able to kink a Tuffy, then see how easily the patented braided wire fabric straightens out without material damage.

Get FREE Sling Sample—See For Yourself All The Advantages of Tuffy Slings

To see how entirely different they are you just have to handle and try out a Tuffy Sling. That's why we have made up a supply of 3 ft. samples. Get yours and prove for yourself Tuffy Sling superiority. Fill out the coupon—It's FREE.

UNION WIRE ROPE CORPORATION

2234 Manchester Avenue Kansas City 3, Missouri

Please send FREE of Cost—

☐ Tuffy Sling Handbook

☐ 3 ft. Sample of Tuffy Sling

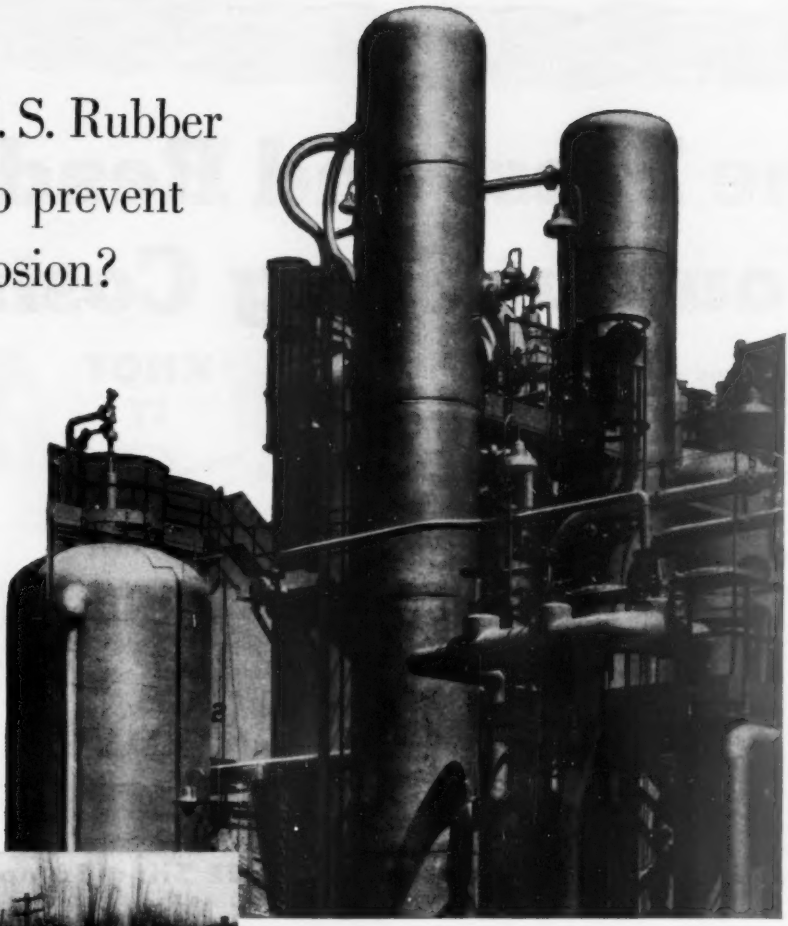
*Name*_____

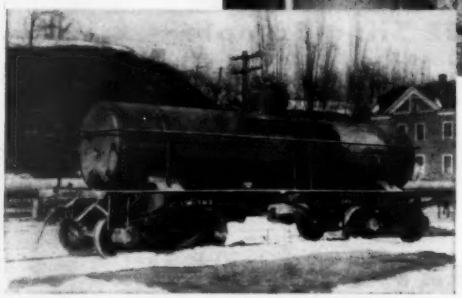
*Title*_____ *Company*_____

*Address*_____

*City*_____ *State*_____

What's U. S. Rubber doing to prevent corrosion?





ROYALGUARD PROTECTIVE COATING has excellent resistance to weather. It will not crack or chip. It is ideally suited to protect chemical processing equipment, tanks, tank cars, pipes, fittings, structural steel parts and machinery.

U. S. Royalguard, the new, remarkable protective coating, is a wonderful defense against corrosive attack. Sprayed on surfaces of steel, aluminum, concrete, hardwoods, masonite and transite, it provides effective resistance against a wide range of chemicals. Royalguard reduces maintenance and replacement costs. It has high film flexibility and adhesion qualities, becomes tack free rapidly at room temperatures, has excellent reverse impact resistance, requires no primer. For more information about Royalguard write to address below.

PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N.Y.

"We can't keep up with them since they got those new THOR SCREWDRIVERS"

Thor TOOLS

Thor Portable Electric Screwdrivers and Nut Setters have speeded up production on thousands of assembly line jobs ever since Thor invented the *first* power screwdriver. For a demonstration of Thor *power . . . precise adjustment . . . handling ease* in your plant, call in Thor assembly tool experience — or write for free catalog.

Independent Pneumatic Tool Co., Aurora, Ill.

DRILLS • IMPACT WRENCHES • SCREWDRIVERS • TAPPERS
NUT SETTERS • GRINDERS • SANDERS • BENCH GRINDERS
POLISHERS • SAWS • HAMMERS • NIBBLERS
BALANCERS • BELT SANDERS • VALVE SHOPS • ACCESSORIES

BUY IT from your DISTRIBUTOR

FACTORY SERVICE BRANCHES IN 20 PRINCIPAL CITIES

WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

The way to grease modern motors is DON'T!

The modern, *pre-lubricated* Life-Line consigned greased fittings to the motor museum almost ten years ago—and did away with faulty lubrication.

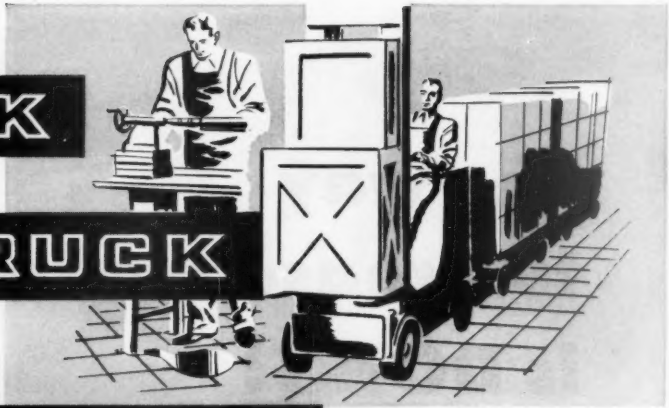
Think what it means. No more incorrectly greased motors. No failures from overlubrication, from under lubrication . . . from use of incorrect or dirty grease. Correct lubrication is sealed in . . . in advance.

Result? Longer motor life. Over a half million *pre-lubricated* Life-Line motors operating in every conceivable type of application have proved that outages from incorrect lubrication have been eliminated completely.

Take the case of an eastern manufacturer, for example. Motors were installed high on a press—out of reach of a maintenance man. Consequently, motor lubrication was forgotten. Bearings failed—windings burned. Then *pre-lubricated* Life-Lines were installed. Failures disappeared. Today, motors are still forgotten—but safely.

Remember, the way to lubricate a modern motor is don't. And, to spot a *truly* pre-lubricated motor, look for a motor that has *no* grease fittings. You'll *know* then it needs no greasing attention. You'll find your answer in Life-Lines.

Ask your nearby Westinghouse representative for a copy of "Facts on Pre-lubricated Bearings, B-4378", and for all the reasons why Life-Lines offer you more service on the job . . . less servicing. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21682



WORK and TRUCK on *Vina-Lux* FLOORS

The New Vinyl Flooring All America Is Talking About!

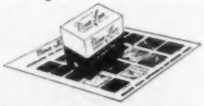
WHEN YOU WORK on Vina-Lux, you work without worry about spilled oil and grease — the dropping of heavy tools or parts. Abuse and impact resistance is built into Vina-Lux.

WHEN YOU TRUCK on Vina-Lux, you appreciate its remarkable wearing qualities — its ability to take heavy rolling loads constantly without deterioration.

WHEN YOU CLEAN Vina-Lux floors, you realize how simple and economical they are to maintain. Its tight, super-smooth surface refuses to absorb dirt — needs no waxing.

WHEN YOU VIEW your safety record with Vina-Lux floors, you'll praise its non-slip surface that makes it safer to walk or to work on — you'll appreciate its easy-on-the-feet comfort.

WHEN YOU EXPAND your facilities, you'll save money, because Vina-Lux tile by tile installation readily permits relayout of plant area with a minimum loss of valuable manufacturing time.



See your nearest Azrock flooring contractor for samples of Vina-Lux or write us for color chart and samples.

AZROCK FLOORING PRODUCTS

UVALDE ROCK ASPHALT COMPANY

FROST BANK BUILDING • SAN ANTONIO, TEXAS

Makers of AZROCK Asphalt Tile, AZPHLEX Thermoplastic Tile, VINA-LUX Reinforced Vinyl Tile, DURACO Industrial Tile

Azrock Floor Products Serve Industry

WATER HARDNESS CUT TO ZERO

at record rate of 240,000 gallons per hour!

THIS king-size, outdoor water-softening system was recently installed by Allis-Chalmers to meet the special needs of a leading midwest oil refinery. It furnishes four high-pressure boilers with filtered treated water at the extraordinary rate of 240,000 gallons per hour—the largest water-softening system ever installed in a refinery power plant.

Extremely rugged and designed for year-round operation outdoors, this Allis-Chalmers system has been in service about four years. There have been no breakdowns, and maintenance costs have been practically nil.

Allis-Chalmers also serves petroleum refineries—as well as every basic industry—with pumps, motors, machinery and equipment for generation, distribution and control of electric power.

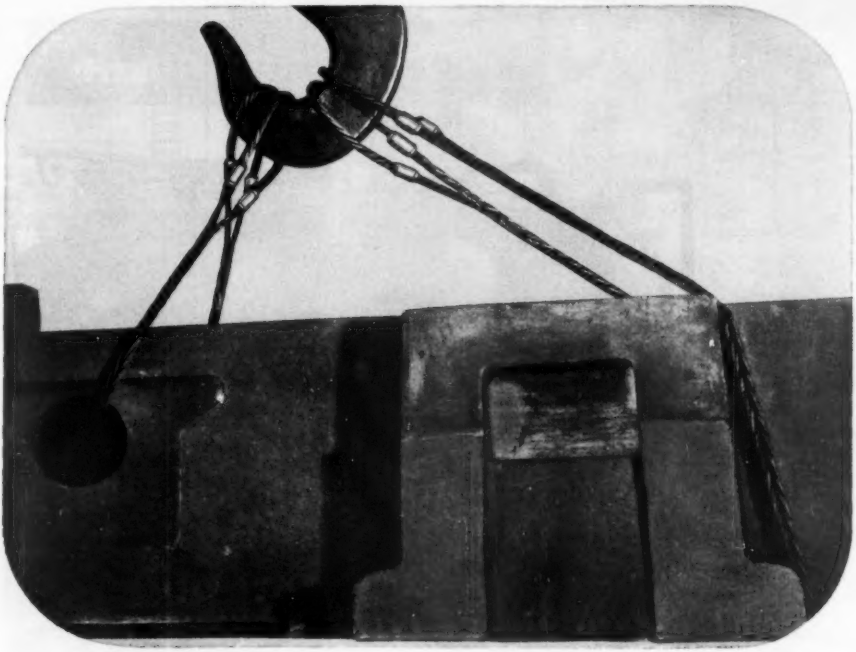
Allis-Chalmers
Makes Machinery to Help
People Produce More—
Have More—
Enjoy More Leisure Time—
LIVE BETTER!

ALLIS-CHALMERS

GENERAL MACHINERY DIVISION

MILWAUKEE, WIS. — PITTSBURGH, PA. — NORWOOD, OHIO — BOSTON, MASS. — TERRE HAUTE, IND. — MONTREAL, P. Q. — ST. THOMAS, ONT.

FLATWEAVE SLINGS



For more speed at lower cost . . .
Roebling Flatweave Slings

ROEBLING FLATWEAVE SLINGS are specially constructed with wide, flat bearing surfaces which distribute the load and prolong the sling life. Flatweave Slings speed up operations because they're extra flexible, kink-resistant and easy to handle. The loops at each end can be used as chokers or slipped over lugs and hooks.

Write for the "Roebling Sling Data Book." It describes Flatweave Slings...gives money-saving facts about Roebling's full sling line. John A. Roebling's Sons Company, Trenton 2, N. J.

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 701 ST. CLAIR AVE., N. E. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

41%

OF INDUSTRIAL WORKERS
ARE VISUALLY UNQUALIFIED FOR THEIR JOBS

The record of visual performance tests of more than 5,000,000 individuals, in 4,000 job categories, reveals that, regularly, four of every ten industrial workers are visually unqualified for satisfactory performance on their jobs. It also shows just the degree to which these are the workers who are responsible for high costs . . . in accident rates . . . in waste and rejects . . . in labor turnover . . . in training time . . . in absenteeism.

YOU CAN IDENTIFY THE "VISUALLY UNQUALIFIED" IN YOUR PLANT

The Bausch & Lomb Occupational Vision Service is a scientific method for determining visual standards for every job, for identifying those who qualify, and for correlating visual skills to job requirements . . . to the profit of the employee and the employer.

A PROVED METHOD TO HELP YOUR PLANT MAKE MONEY 9 WAYS

The Bausch & Lomb Occupational Vision Service is available to you. It is easy to administer. Employee participation is voluntary . . . *and workers like the program.* Benefits which accrue in plants using O.V.S. (benefits which can accrue in your plant, too) include:

1. **Improved quality of production**
2. **Increased production per worker**
3. **Reduced waste of materials and work rejects**
4. **Improved accident record**
5. **Reduced labor turnover**
6. **Lowered training cost**
7. **More effective placement**
8. **Reduced absenteeism**
9. **Improved employee relations**

MAIL TODAY!

Send for the brochure "Eyes Right for the Job," which tells what the Bausch & Lomb Occupational Vision Service is, how easily it can be administered in your plant, and at what low cost.

Bausch & Lomb Optical Co., 95210 Smith St., Rochester 2, N. Y.

Please send me the brochure "Eyes Right for the Job," and complete details on the Bausch & Lomb Occupational Vision Service.

Name ..... Title .....

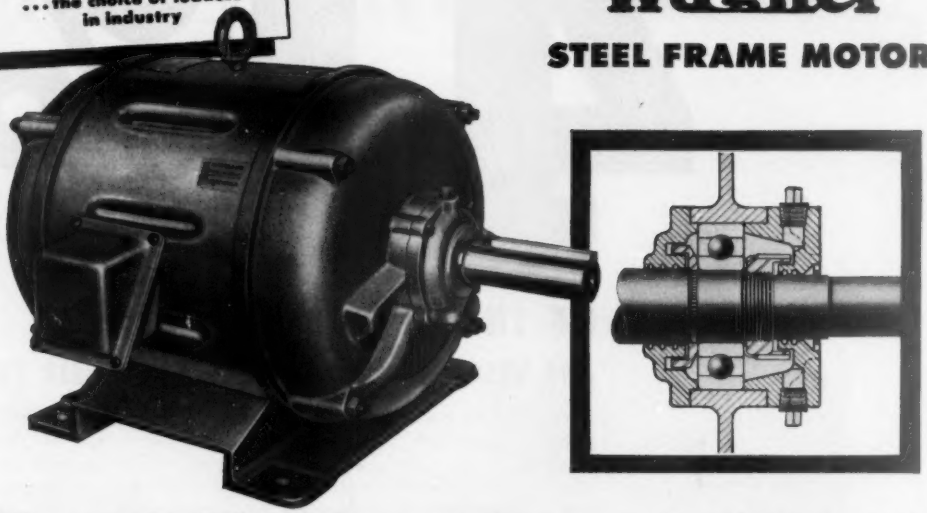
Company .....

Street .....

City ..... Zone ..... State .....

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Wagner
STEEL FRAME MOTORS



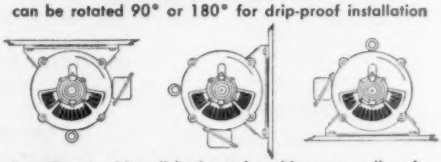
This sealed-bearing motor can be lubricated

Wagner Steel-Frame general purpose polyphase motors are equipped with labyrinth sealed bearing housings that effectively prevent the entrance of any dirt or grit that might cause premature wear. It is not necessary to lubricate the bearings—motors in the smaller frame sizes operate for years without relubrication. But... these Wagner Motors are provided with two lubrication openings — you *can* lubricate your motors when necessary or desirable, to add years of useful motor life in unusually severe applications.

Wagner's Bulletin MU-131 gives valuable information concerning proper lubrication of electric motors — Copies will be sent you on request.

DRIP-PROOF... 3 WAYS

These open-type motors (in frames 326 and smaller) are completely drip-proof in any horizontal position because there are no openings in the frame and the end-plates can be rotated 90° or 180° for drip-proof installation



in ceiling or sidewall horizontal positions, as well as in the normal horizontal position.

Wagner Steel-Frame Motors are available in electrical types to meet most industrial requirements. Bulletin MU-185 gives full information—write for your copy.

WAGNER ELECTRIC CORPORATION
6412 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner Electric Corporation
EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

A52-17

ONLY Milwaukee SAWZALL

gives you all these features...

1. **NEW** — SINGLE UNIT, ALL-PURPOSE PORTABLE ELECTRIC HACKSAW
2. Light weight — only 6¾ lbs.
3. 2250 strokes per minute (¾" stroke)
4. Lifetime lubricated throughout...ball and roller bearing equipped
5. Compact — only 14¼" long
6. *Milwaukee-Built* 9-point motor . . . famous for MORE "motor guts"
7. Blades for cutting *all* materials

Cutting a curve in metal is one of many time-saving and unusual uses of this amazing **new** tool. SAWZALL soon pays for itself.

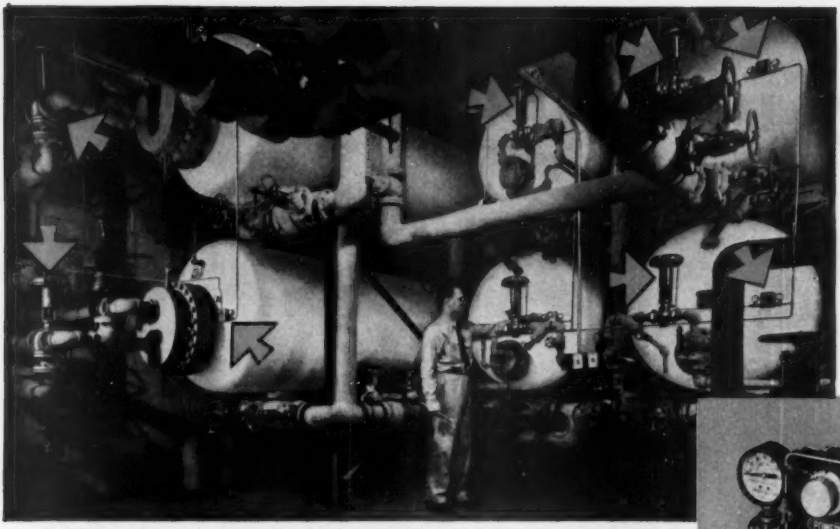
$78.50

including Blades and Steel Carrying Case

Write for Folder SW-5

You get
BETTER QUALITY
LONGER LIFE
for less money
WITH MILWAUKEE PORTABLE ELECTRIC TOOLS

MILWAUKEE ELECTRIC TOOL CORP.
5346 W. State St. • Milwaukee 8, Wis.
Canadian Distributor:
Matthew Moody & Sons Co., 740 Inspector St., Montreal



WATER HEATERS AT LEVER HOUSE
New York City

Architects: Skidmore, Owings & Merrill

Consulting Engineers: Jaros, Baum & Bolles

Contractor: Gillman-Rous-Pesce Corp.

One of Lever Brothers Co. Famous Soaps

Chief Engineer Edward MacDonald states "Performance of Powers Accritem Temperature Regulators has been highly satisfactory on the 6 water heaters shown above as well as on booster heater for dishwasher and for controlling cooling of condensate before discharge to sewer."

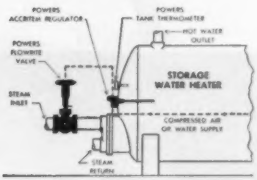
Powers ACCRITEM Regulator
Compressed Air or Water Operated

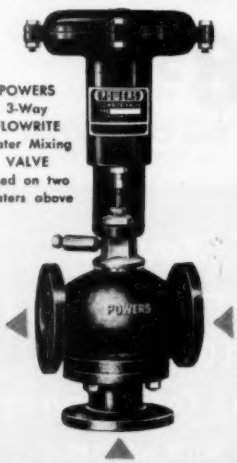
POWERS WATER TEMPERATURE CONTROL

ACCRITEM Regulators were selected for LEVER BROTHERS beautiful modern building on Park Avenue in New York City. The air conditioning system here is also Powers controlled.

Water heaters in more and more prominent buildings are being equipped with Powers Accritem Regulators because of their —

Unsurpassed for reliability and power to operate large or small diaphragm valves controlling Water Heaters, Heat Exchangers, Jacket Water Cooling for Diesel Engines or Air Compressors and many Industrial Processes.





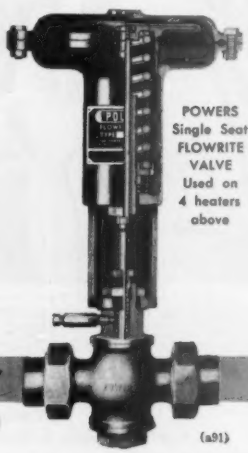
POWERS 3-Way FLOWRITE Water Mixing VALVE Used on two heaters above

Important Features that Give Better Control and Lower Maintenance

- ***Adjustable Sensitivity*** and over-heat protection.
- ***Calibrated Dial*** temperature adjustment.
- ***Simple, Rugged Construction*** withstands vibration and insures years of reliable service.
- ***Temperature Ranges*** 50-250° F. and 150-350° F.
- ***Easy to Install.*** Requires 15 lb. supply of compressed air or water for its operation.
- ***Small Size***—regulator head is only 2⅞" x 3⅜", sensitive bulb is 12" long with ½" I. P. S. connection.

Bulletin 316 gives full details

Call Powers for aid with your problems of temperature control. Our more than 60 years of experience may be helpful to you. Whether you want a simple self-operated regulator or thermostatic water mixing valve or a pneumatic control system with recording controllers...contact Powers.

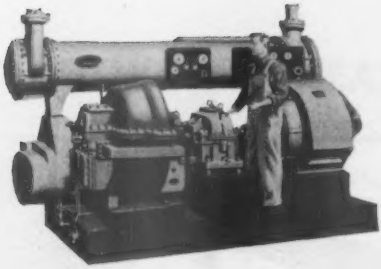


POWERS Single Seat FLOWRITE VALVE Used on 4 heaters above

THE POWERS REGULATOR COMPANY

Skokie, Ill. • Offices in Over 50 Cities, See your phone book • Established 1891

(a91)



Who's that behind Old Faithful?

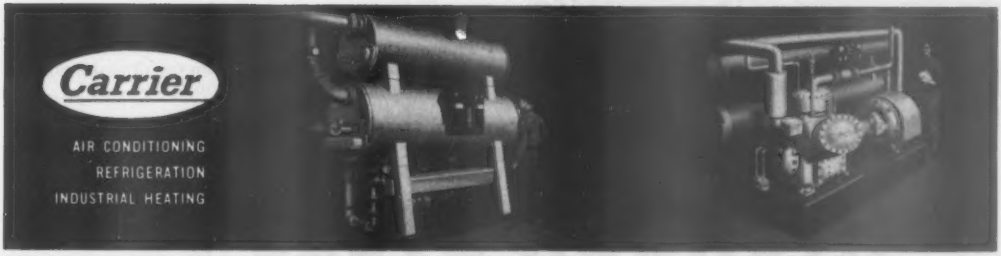
There's quite a line-up of experts behind the Old Faithful of refrigerating machines . . . the Carrier Centrifugal.

Carrier engineers designed this machine to be the kind that'll run without breakdown year after year. These Carrier engineers pioneered and developed centrifugal refrigeration in the first place, and they've perfected many engineering improvements which mean extra reliability on the job. An ingenious shaft seal, for instance — an automatic oil seal that has no metal-to-metal contact. Kingsbury thrust bearings and cupronickel tube-sheets are other reasons for the Carrier Centrifugal's amazing performance records.

Carrier craftsmen stand behind Old Faithful too. During the past 30 years they've built some 2500 of these multi-stage centrifugals — many more than anyone else in the business. Experience like that spells dependability.

And *Carrier servicemen*, part of the largest, most experienced national service organization in the industry, insure the reliability that's been engineered and built into each Carrier Centrifugal. Seldom called, these experts are at your service on a moment's notice.

Better get the whole story on the Carrier Centrifugal Refrigerating Machine. It's all in an informative catalog, "Centrifugal Refrigeration." Ask for a copy at the Carrier office nearest you, or write Carrier Corporation, Syracuse, New York.



The same reliability is yours in a Carrier Absorption Refrigerating Machine (left) which produces refrigeration from high-pressure or low-pressure steam or waste steam from other plant equipment; and in the packaged Carrier Reciprocating Refrigerating Machine (right) which in many applications may be your most economical choice. Whatever your refrigeration requirements, there's a reliable Carrier machine to meet them.

Dial face of Rockwell hardness testing machine registers C-38 hardness of Ryerson Type 410 stainless as required by shipbuilder.

Ryerson Hits High "C's" for Shipbuilder

Another Example of Ryerson Service on Special Requirements

Material must be capable of heat treating to a minimum hardness of Rockwell C-38.

That was the high hardness rating specified by a Seattle shipbuilder on his rush order to Ryerson for 1500 pounds of Type 410 straight chrome stainless.

First problem facing the shipbuilder—the fact that Type 410 chrome stainless is not regularly stocked by most steel warehouses. A call to the local Ryerson plant, however, disclosed that the urgently needed steel could be shipped quickly from another Ryerson plant.

Next question; Would the stainless from Ryerson meet the shipbuilder's minimum hardness requirements? In our own well-equipped laboratory, we quickly determined that the Type 410 on hand met the hardness specification.

The steel was then trucked to the airport, flown to Seattle and delivered on schedule.

This is a typical example of how Ryerson often can help you meet unusual specifications. It's an example of how large, diversified stocks, unequalled facilities and the practical cooperation of steel specialists are combined at Ryerson to save you time and trouble. And it's a good reason for you to call Ryerson whenever you need steel.

Though the strike and heavy demand have caused many shortages, you'll find we can usually take care of most requirements—even the tough ones.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS—BARS, STRUCTURALS, PLATES, SHEETS, TUBING, MACHINERY & TOOLS, ETC.

RYERSON STEEL

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

Some Taft-Hartley change seems certain next year. Not repeal—no matter who wins the election.

Even Stevenson doesn't really mean it when he cries "repeal." That would mean going back to the New Deal's Wagner Act. The Democratic candidate won't go that far. But "repeal" is a magic word to labor leaders. So Stevenson picked it up and is running with it.

Both Stevenson and Eisenhower would alter the controversial labor law. But Stevenson would go further than the general. Both agree that some Taft-Hartley principles should stay: unfair practice charges against unions, free speech for employers, contract responsibility, curbs on jurisdictional strikes. You can count on these.

•

Where the candidates disagree is where you can look for possible changes.

•Stevenson would kill the labor injunction, restore the closed shop and most secondary boycotts, permit seizure in national emergency strkies.

•Eisenhower would likely keep the injunction, but limit its use. He would oppose seizure unless authorized by Congress in specific situations. Economic strikers would get to vote in bargaining elections. That's one of the union-busting sections of Taft-Hartley the general was talking about in his AFL speech.

•

Employer organizations will kick in some ideas of their own when Congress starts reshuffling Taft-Hartley. One is to curb industry-wide bargaining and restrict monopoly. Bills in this Congress to limit the size of the bargaining unit and bring unions under the anti-trust laws will be revived next year.

Communists in union leadership will get serious attention. The non-Communist affidavit will either be discarded or extended to include employers as well as union leaders. General Electric thinks Congress should set up a special agency to identify Communists and remove them from key union posts. "Employers are not policemen." Sen. McCarran would make it unlawful for a Communist to hold union office or represent a union in bargaining.

Whether Stevenson or Eisenhower wins, keep this in mind: Neither will be able to deliver on his promises. What changes are made in Taft-Hartley must come out of the 83d Congress. As before, you can expect this Congress to be more conservative on labor legislation than the occupant of the White House.

This means that, in the end, whatever change is made in Taft-Hartley will be something less than the candidates promised.

•

Some labor organizations have adapted themselves to Taft-Hartley. Both the CIO and the AFL building trades, for instance, have set up machinery for settling jurisdictional disputes without use of the labor law.

AFL printers have defied Taft-Hartley from the beginning. Its officers have refused to sign non-Communist oaths or make any use of the law. Yet, this union has just required all members to sign a loyalty oath denying membership in the Communist party.

•

Union members won't always follow their leaders. Recent instances of revolt may be significant—for management, labor, and politicians alike:

•At Douglas Aircraft's Santa Monica plant, workers voted down a strike call, accepted management's wage offer. This left the AFL machinist's union in a hole at Douglas's El Segundo plant. There the union struck, rejecting the offer its members had previously accepted at Santa Monica.

•At Harbison-Walker Refractories, CIO strikers at one plant defied their leaders. They went back to work, leaving other CIO members on strike at 11 other plants.

•At Lockheed, thousands of AFL strikers joined a back-to-work movement, undermining the union's position.

•In the CIO Gas, Coke and Chemical Workers, President Martin Wagner lost re-election to youthful Elwood Swisher. Swisher opposed a boost in per capita tax payments from $1 to $1.25. Wagner proposed it.

SEE ALSO PRACTICAL LABOR RELATIONS, PAGE 236

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Most manufacturers can look forward to a fast pace of production and sales for six months or more. The outlook is so rosy, in fact, that it makes one want to double-check the record. Here it is:

•Defense spending, now running at an annual rate of $50-billion a year, will rise to about $56-billion by mid-1953. Then it will level out.

•Business spending for plant and equipment will be 4% higher this year than in the record year of 1951, according to a survey just finished by the Securities and Exchange Commission and the Department of Commerce. Following the year end, however, business capital spending looks like it will taper off.

•Manufacturers' sales of non-durable goods are about 4% over last year. The textile industry particularly has shown widespread improvement. A survey of consumer intentions by the Federal Reserve Board shows that 14% of the consumers plan to buy an automobile in 1953, and 8% plan to buy a house. This was about the same proportion that expressed an intention to buy a car in 1952. A much higher percentage plan to buy a home in 1953 than this year.

This all adds up to a very impressive record. With government, business, and consumers spending at so fast a pace, factory management will have to run to keep up with them. This is a pleasant sort of prospect indeed.

•

What, if anything, could be wrong with this outlook? There are only two things that it seems possible to get worried about. One is that the industry outlook is somewhat spotty. The other is that an inventory liquidation by manufacturers could depress the market for metals and primary products.

Some industries are faring better than others. Leather and industrial chemicals are not yet showing as high a sales record as last year, for instance. New orders of transportation equipment are falling off; unfilled orders are still high, but a downturn may be in sight. The expansion of plant and equipment is over the hump for most industries. Capital spending is still rising because the big expansion plans in a few industries—aluminum, steel, petroleum, chemicals, mining, electric power—are not yet finished. But capital investment is on the downgrade for food, paper, textiles, transportation equipment, machinery, metal products, and stone and clay products.

None of these industries can be said to be depressed; they are operating at a high level. The strong outlook for the next six months will help them stay active. The most that can be said of these industries is that they are off their peak. Will other industries join them in passing over the hump? Prices are the key to the answer.

•

The prices of consumer goods are likely to be steady in the near future—no inflation, no deflation. There is too much capacity for inflation to take hold again, barring war scare. Buying strength across-the-boards is still too large to allow any widespread deflation.

•

In industrial commodities there does seem to be the possibility of change, on the downside. The main question is, "When?"

Manufacturers' inventories are moving more and more into fabricated form. During the past year raw material inventories of all manufacturing industries have declined 4%. Goods in process have increased 22% and finished goods 10%. With these figures you can practically see the goods moving down the assembly line. The proportion of finished goods is likely to increase further in the future, as defense industries get into full swing turning out armament.

That means manufacturers' inventories are returning to their historic balance. Raw materials inventories were unusually large during the last year. As they work off and new orders level out, the demand for materials will be less than it has been. This will lead to sagging prices, particularly for metals—probably late this year or early next.

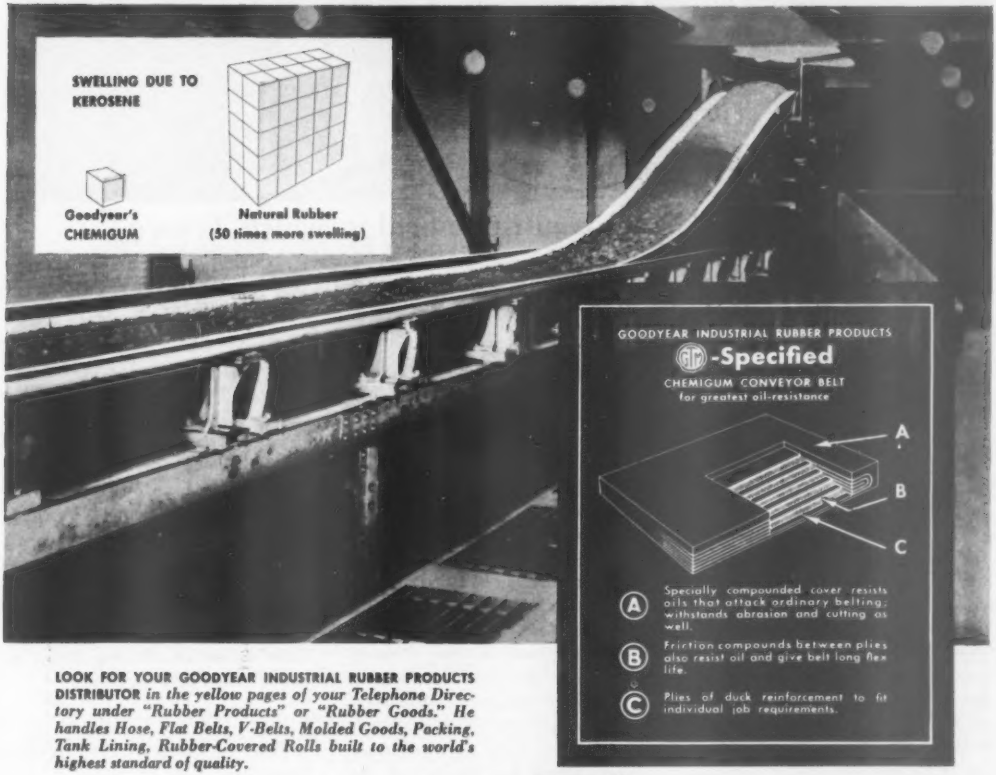
•

We have looked hard to find trouble spots. Spotty industry performance and inventory liquidation may be of some concern. But by and large, you can ride a new ground-swell to higher volume at steady prices this fall and winter.

Here's the LONGEST-LASTING BELT for handling Oil-Treated Fuel

HERE'S graphic evidence of the oil-resistance built into the covers and carcass of CHEMIGUM conveyor belts—designed by the G.T.M.—Goodyear Technical Man—for use in service where severe oil and grease conditions cause premature failure of conventional belts.

Tests with kerosene show that Goodyear CHEMIGUM covers swell only 2% as much as high-grade conveyor covers made from natural rubber. (See Chart.) CHEMIGUM will also resist oil far better than many other oil-resisting synthetics used in belts. When destructive effects of such solvents are present, consult the G.T.M. for full details, or write Goodyear, Akron 16, Ohio.

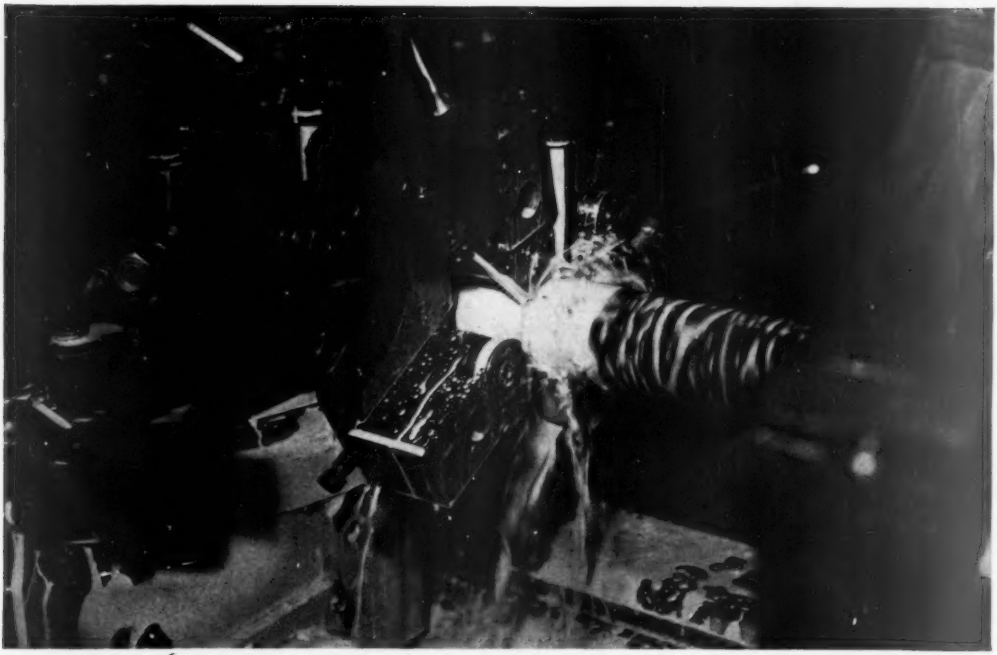

SWELLING DUE TO KEROSENE
Goodyear's CHEMIGUM
Natural Rubber (50 times more swelling)
GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified
CHEMIGUM CONVEYOR BELT
for greatest oil-resistance
A
B
C
A Specially compounded cover resists oils that attack ordinary belting; withstands abrasion and cutting as well.
B Friction compounds between plies also resist oil and give belt long flex life.
C Plies of duck reinforcement to fit individual job requirements.

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

THE GREATEST NAME IN RUBBER

Chemigum—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



METAL WORKING is just one field in which Texaco . . .

Ups Production and Reduces Unit Costs . . .

Management's battle to keep its production curve pointed up and the curve of unit costs pointed down is never ending. Industry welcomes any help to attain these ends.

One important source of such help for all industry is available throughout the 48 States. Texaco Lubricants and Texaco Lubrication Engineering Service are famous aids to increased production and lower unit costs. A few examples are drawn from the hundreds on file — names and details on request.

* *Metal Working* — Specific figures are more available in this field than most others. Texaco cites: 1) a Chicago manufacturer's 233% increase in gear production per cutter life; 2) a 30% reduction in rejects for a Rochester plant; 3) another manufacturer's saving of 1,800 gallons of oil, $350.00 in pump repairs, and increased production of 50,000 units in one year from just one aluminum die casting machine.

* *Diesel Engines* — So many instances of reduced wear, reduced maintenance costs and lower fuel consumption have been achieved with Texaco's help that — *for over 15 years, more stationary Diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.*

* *Other Fields* — Aviation, copper mining, construction, railroads — these are a few of the fields in which Texaco is preferred.

In your own plant, effective lubrication — Texaco — can help you produce better, faster, and at a lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Lubricants, Fuels and Lubrication Engineering Service

Faithfully yours 50 *for Fifty Years*

TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

To get out the vote, you need to know

WHY VOTERS DON'T VOTE

THE BARRAGE OF "Be-sure-to-vote" material we are seeing this fall is the result of the shockingly low turnout at the last presidential election. Only 51% of the eligible voters voted. Chances are you may be doing something in your plant to help get out the vote. Or maybe you would if you could think of something effective to do.

Here's a suggestion: Conduct a poll of workers in your plant to find the reasons that non-voters didn't go to the polls. Then you'll have an idea of what you're up against in your effort to get out the vote—what the "feelings" are you'll have to combat.

In running the survey, don't forget to ask about whether workers' wives voted—and if not, why not. Remember, your get-out-the-vote campaign will be only half a success unless you inspire your workers' wives to vote, too.

If yours is a big plant, you might conduct the survey just in one typical department—to keep it simpler. No matter how large your survey, be sure to post the results for everybody to see. This way, you can enlist the poll itself to stimulate interest in voting.

Your survey needn't be time-consuming. The whole thing can be done in a day if you survey about 100 to 150 people and use two or three interviewers. You may want to get outside researchers, but you can use alert people right from your own office.

Here's a survey from one plant...

...in Cleveland—the Interior Steel Equipment Co. It was made at our request Sept. 11 by Special Surveys, a Cleveland research organization. It can serve as a "pilot operation" for you.

Interviewers talked to all eligible voters in the factory and office—121 of them. The questions are reproduced on page 296. If you want to use the same questions (there's no copyright), those about the 1950 state election could easily be modified to suit your locality.

...and here's what it revealed...

...as summarized in a tabulation of what the workers said:

Voted in 1950	65%
Voted in 1948	63%
Never missed voting in presidential election	37%
Wife voted in '50	51%
Wife voted in '48	57%

The Special Surveys people warn that these claims are probably inflated. There's a natural inclination for people not to admit they didn't vote.

The real meat of the survey was the reasons for not voting. Here is a brief summary:

Of the workers who didn't vote 29% were not registered; of the workers' wives who didn't vote, 40% weren't registered.

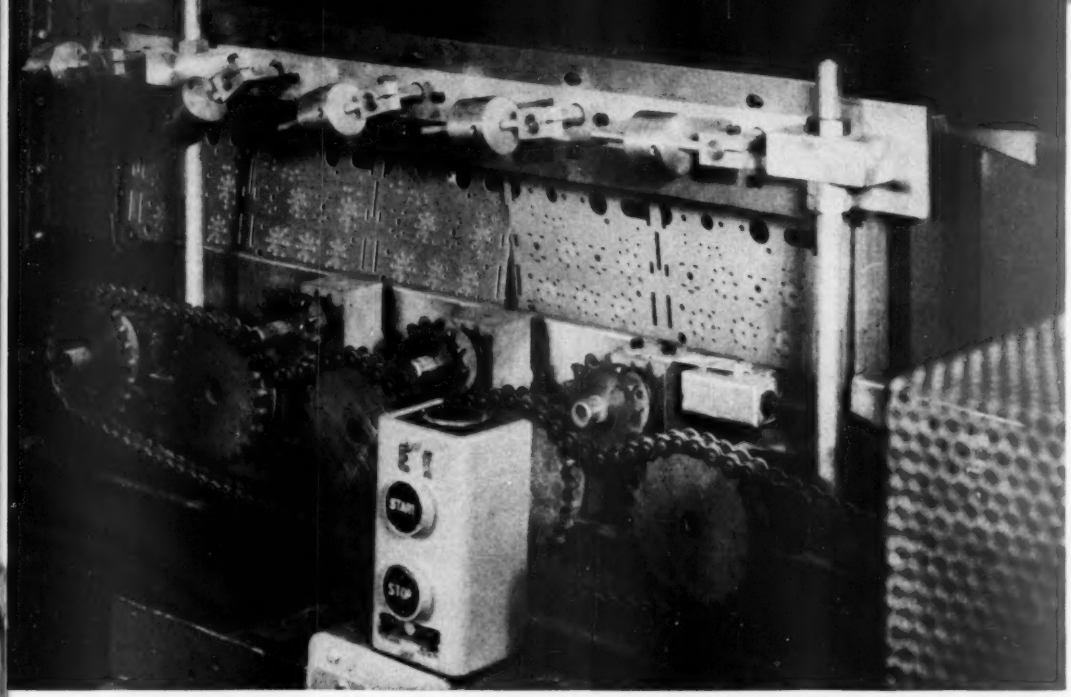
Non-registration was about the only big reason that workers gave for their own or their wives' not voting—except a couple of excuses, "away at the time" (19%) and "moved" (13%).

The really *basic* reasons were unquestionably those that the workers attributed, for vanity's sake, to "some other people." That's why one question asked what workers thought were other people's reasons for not voting. These are the highlights of the answers:

Careless; lazy; didn't get around to it	29%
No interest in politics, government	23%
Know too little about politics and candidates	17%
Dislike candidate(s)	15%
Doesn't matter; neither side is any good	13%
One vote doesn't count	17%

Here, then, is what this Cleveland plant faces as it tries to encourage its workers—and, through them, their wives—to vote. The individual interview sheets (just 1½ pages, and all anonymous) give a wealth of detail for developing educational material and counter arguments.

Why not equip yourself with the same facts about how *your* workers feel—then go to work to correct the situation in the few weeks left before election?



PLATED CIRCUITS are the key to Motorola's future plans for automatic assembly. This is the start of the conveyorized line that moves radio chassis strips through printing and plating operations. See page 86 for details.

With plated circuits Motorola takes

Big Step Toward Automatic Assembly

WHY THIS ARTICLE IS IMPORTANT: *"Re-thinking" (said the designers of the automatic piston plant described in FACTORY, April 1952, page 74) is basic in any plant's approach to making operations completely automatic.*

Their definition of re-thinking:

"It starts with the ability to look at the functions performed by an end-product and asks the question, 'Can some other product, made by a process more suited to automatic control, perform the functions which the user expects of this product?'"

It's this kind of re-thinking that led Motorola to plated circuits—and which will eventually lead Motorola to completely automatic assembly.

That is why FACTORY publishes this exclusive article. Not so you'll know how to make plated circuits—but so you'll understand this re-thinking concept and recognize its very real importance to your company and yourself.—THE EDITORS

By **ELMER H. WAVERING** • Vice President
Consumer Products Division, Motorola, Inc., Chicago

IN MID-AUGUST Motorola announced that it had perfected and put into mass production radios with plated circuits that replace the conventional hand-wired and hand-soldered chassis (FACTORY, Sept., p. 274). We cited benefits: The new radios will work better, sound better, last longer, need less attention, and be lighter and more compact. But I'm sure few readers looked behind the words and saw the biggest benefit behind placir*—and the reason why we spent several years and a lot of money developing it.

The reason: *Motorola wanted to make automatic production of radios and other electronic equipment possible.*

Radios had been made in much the same old way for at least 30 years. Circuits had been redesigned,

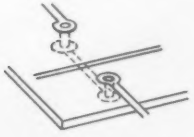
*Pronounced "play-sir." It's what the industry is calling the plated circuit technique.

production techniques smoothed out. But the principle of soldering wires and components in place by hand, and inserting tubes by hand, had gone unchanged. Now, Motorola doesn't yet have automatic production of radios. We still have to insert components by hand and solder them in place. But plated circuits—since they are all identical, with contacts in one flat plane instead of being spread all over the inside of a box-like chassis—*make possible for the first time the automatic insertion of tubes and other components, and automatic soldering of these components in place.* And the equipment for these automatic operations is even now in the development stage.

THE IDEA IS NOT NEW • The concept of plated circuits had been kicking around for several years. Back in 1946 we were working on a mechanical type of printed circuit, which never quite worked out to our satisfaction. Then in 1947 Temple Nieter, who now heads up our plated circuit operation, found a man who had an idea for plating copper onto Bakelite—but no application for his idea. Nieter took the idea and made a few tests. The process worked.

He then developed the principle of plating *through a hole* in the Bakelite. Up to that point we'd been stymied by the problem of intersections of "wires." With conventional wires you merely cross over. But you can't cross two uninsulated lines in a plated circuit. The idea of plating through a hole broke us loose. A look at the sketches will show why.

You can cross two insulated wires, but . . .



. . . with plated circuits you have to lead the conductor through the Bakelite, bring it up on the other side.

In attaching components with through-the-hole soldering . . .

. . . solder applied at **A** will "run uphill" by capillary action to **B**, making a good joint. This makes it possible to solder from one side of chassis only, an important requirement for automatic operation.

Nieter then got an enthusiastic go-ahead—and additional help. He abandoned all previous concepts. He has several thick notebooks full of "Rube Goldbergs." Some of them never got past the notebook stage. Many of them can be seen in the new sets, and in the machines in our placir chassis plant here in Chicago. Some are yet to come.

The machines we're now using were completely foreign to electronics manufacture. They were all designed by Motorola men, and built and debugged by our men. The placir plant shows clearly how we've abandoned the eye-dropper improvements we'd been struggling with for years, and gone to work with a shovel—or maybe a steam-shovel.

Two years ago, when the first new machines were in the building stage, George Johnson, a chemical engineer, was put in charge of production. He's been largely responsible for taking placir out of the laboratory and putting it into mass production.

We started with a small table radio. But we'll be ready, when we're sure all the bugs are ironed out, to produce plated circuitry for larger radios and TV sets.

COST PICTURE • Direct cost comparisons are not possible. A placir circuit is not comparable to a conventional wired chassis. The latter comes much closer to being a complete radio.

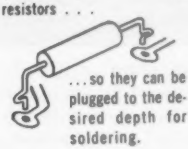
But the cost-saving possibilities are very encouraging. The "ingredients" of a bare placir chassis—Bakelite and copper—are more expensive than a conventional chassis and its leads. But when you start to add the sockets and hand wiring and soldering that placir replaces, the new chassis looks better and better from a cost standpoint.

The biggest savings are in the future. When we perfect automatic soldering and insertion of components, and eliminate the hand work now done on a conventional radio, *that's* when the cost picture is going to reflect the importance of placir.

STILL TO COME • Our next big step, then, is to perfect equipment for automatic insertion and soldering of components.

Our other important problem is to redesign components to make automatic production easier. Most components now come with flexible wire leads. We want them supplied with solid lugs so they can be "plugged into" the placir chassis and will stay in place until soldered. The sketch will show you what we mean. At present our suppliers are in the process of redesigning, to meet our new needs.

Today we have to crimp ends of wire on resistors . . .



. . . so they can be plugged to the desired depth for soldering.

We'd like to get resistors . . .

. . . with lugs that can be "plugged in," then automatically soldered from the bottom.

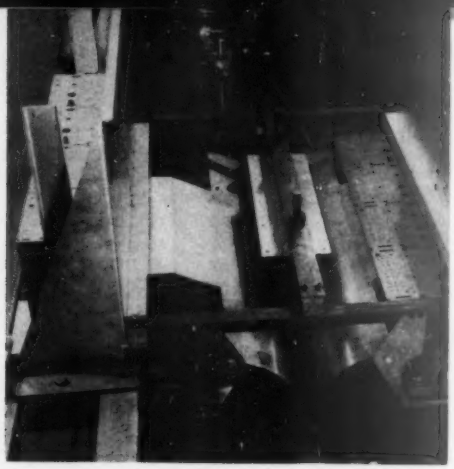
THE REAL THING • For years, every executive in our industry has cherished the idea that someday a revolution in manufacturing methods would take place. Placir is only the opening gun in that revolution. The further improvements that it will make possible are the real thing.

For more about Motorola's program—and what it means to you, turn the page.

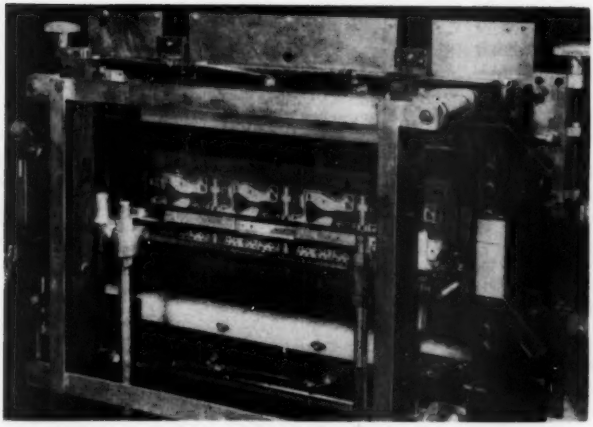
Begins on page 84

HOW MOTOROLA MAKES PLATED CIRCUITS

So you're not making plated circuits—or even thinking of making them? We know. And FACTORY *seldom takes time out to give its readers a blow-by-blow description of a highly specialized production process. This time, however, we've got what look to us like very convincing reasons for straying off the reservation. We think (a) you'll be truly interested in what may well turn out to be a really revolutionary development; (b) you'll see some mighty smart solutions to tough little problems in automatic production that may give you ideas.*—THE EDITORS

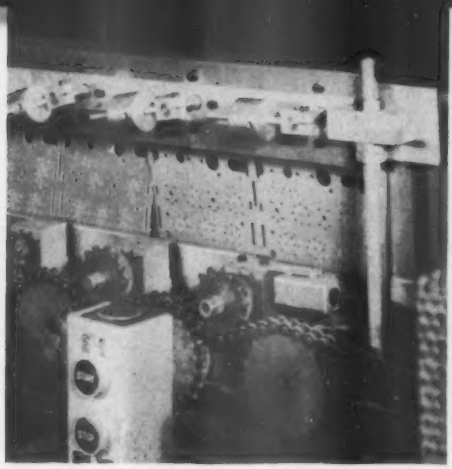


1 BARE BAKELITE CHASSIS STRIPS are loaded automatically, on edge, on two narrow V-belts. Stacks of strips are placed on both sides of the loader. Sides alternate, feeding strip at bottom of pile to belts that serve as conveyor. Loader is designed so that one strip falls leaning to the right, the next to the left. Each strip is pre-stamped for insertion of components, includes four chassis.

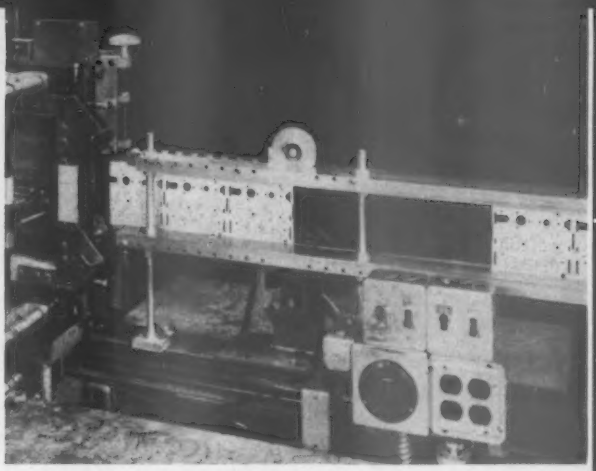


4 PRINTING IS AN ADAPTATION of the silk screen process. The strip is positioned between two fine-mesh screens, which have printing stencils photographically reproduced on them. The stencils are negatives of the circuit and, of course, are different for the two sides of the strip. Then a high-viscosity ink is rubbed by a squeegee over the backs of the two stencils. To facilitate positioning of the strips, the stencils are about $\frac{1}{8}$ inch away from the sides of the strip. They are forced against the strip by the squeegee. The ink passes through the mesh parts of the screen and forms a resistive film over those areas of the strip where Motorola doesn't want electrical conductivity. The screening process is fully automatic, except that the supply of ink on the squeegee must be replenished manually about every 30 minutes. The ink is of such viscosity that it will pass through fine mesh, but will not drip.

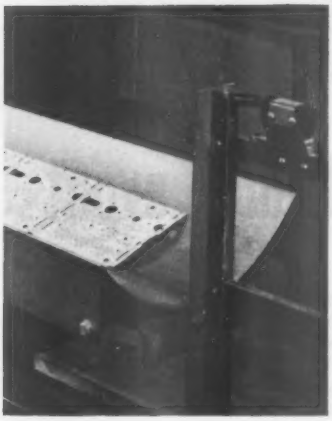
5 CURVED BOTTOM TRAY holds printed strip so it rests only on its edges, and there's no possibility of smearing the newly applied resistive ink. Strip is pushed into tray by following



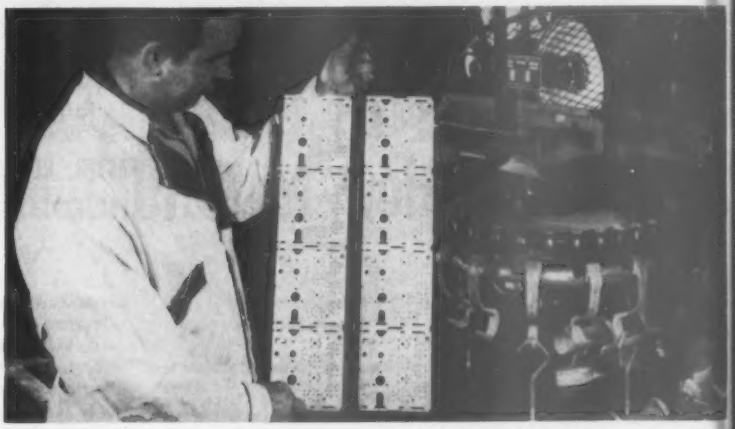
2 **THIS AUTOMATIC DRIVE** powers the entire line. You see now why the chassis lean alternately left and right. Each chassis pushes the one ahead. Only in this area are they driven. The strips in this area push all of those ahead, to the end of the line. Note how the strips are interlocked by small cut-out lugs at the end of the strip. This interlocking keeps the strips in alignment for later operations.



3 **STRIPS ARE THEN SEPARATED** by this unit before they enter the screen printer. Separation is necessary because the printer handles only one strip at a time. It's a batch process instead of a continuous one. Drive wheels you see above strip accelerate it, drive it into printer, where it's positioned by two lugs. Accelerating and positioning are automatic—with limit switch control.

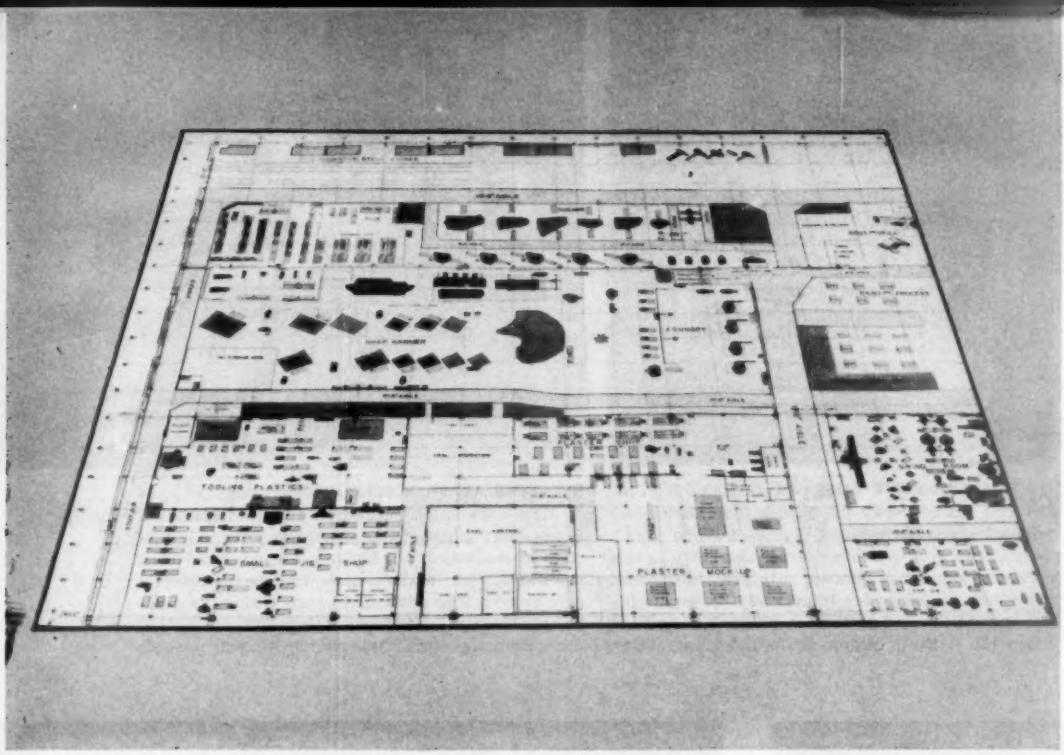


strip entering printer. (Darker areas on strip in tray are where resistive ink has been applied.) From here, strips go into temporary storage—on edge, so ink is not smeared. Then . . .



6 **STRIPS ARE CARRIED BY HAND** to plating tank, in which they are placed on a conveyor. (No immediate plans for making this transfer automatic.) Conveyor is grounded. During the 30-min. trip around the tank, a carefully controlled thickness of copper is plated onto areas not coated with the resistive ink. This means that the copper is plated on to form a positive of the circuit. Strips are then rinsed in running water, given a flash electro-deposited silver coating. Purpose of the coating: better appearance and easier soldering of the chassis. This coating, again because of the resistive ink, adheres only to the copper-plated circuit.

In operations not pictured, ink is softened and removed by rollers, brushes, and water spray. Strips are then dipped in lacquer solution and cut apart into four individual chassis.



From template layouts like this, Lockheed...

How to Get FASTER, BETTER LESS EXPENSIVE Plant Layout

By G. L. THUERING • Associate Professor
Industrial Engineering Department
The Pennsylvania State College, State College, Pa.

Professor Thuering returned to State College last month after a year's leave of absence to take charge of the layout job at Lockheed Aircraft Corporation, Marietta, Ga. This article was written while he was still at Lockheed.

A NEW WAY TO REPRODUCE template layouts is saving us hundreds of drafting hours. And cutting days from the time required to get a new layout in the form of a shop print. That's important because Lockheed has to change layouts frequently.

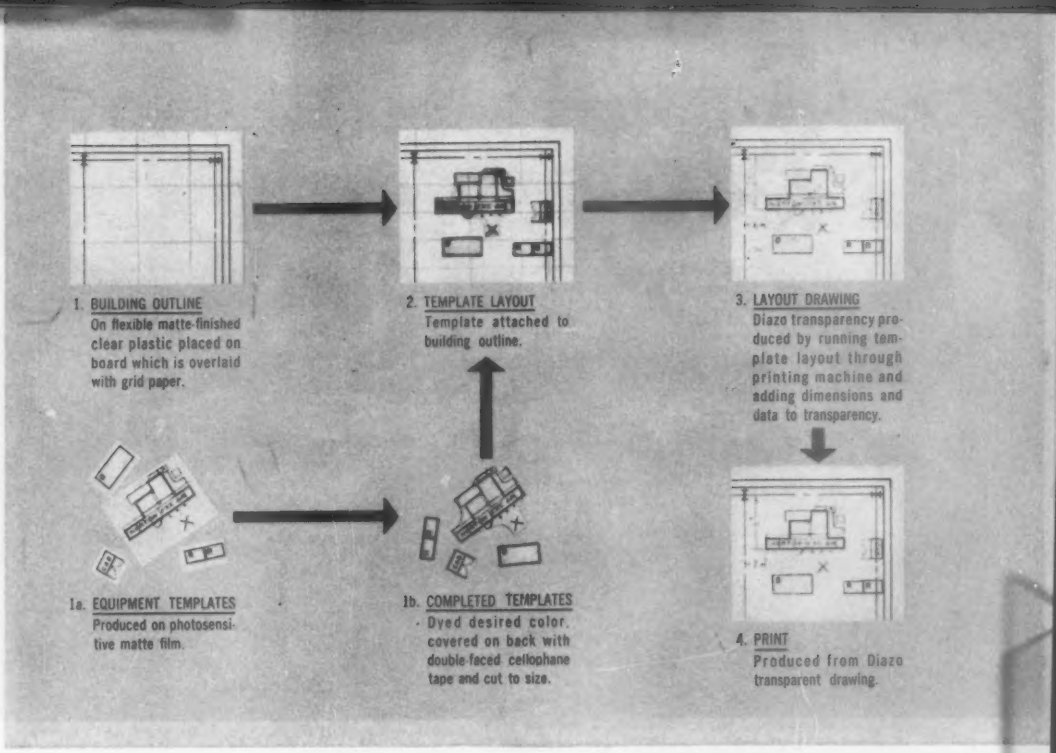
This problem of getting a reproducible drawing after the template layout has been made and approved is a common one. The usual way out is to prepare drawings of the approved layout on tracing cloth from which blueprints can be run off. This involves laborious scaling and detailed drawing of all machines and other pieces of equipment.

A quicker way—which avoids this drafting—is to substitute photographic copies for drawings. Because it is difficult to dimension a template layout, a grid on the layout board usually replaces dimensions when photos are used. This method is workable, but has certain limitations:

1. It produces a layout copy on which no more engineering work can be done.
2. It's expensive, specially when many prints are needed.
3. Counting squares is a poor substitute for dimensions when installation must be accurate.
4. To get clear, sharp photos, white or pastel templates must be used. This detracts some from appearance and reduces selling features of the original template layout.

LOCKHEED'S SOLUTION • We use flexible, plastic templates, which are colored, translucent, and matte-finished. Our layout sheets are flexible, matte-finished, clear plastic.

We cut costs and save time by making templates


1. BUILDING OUTLINE
On flexible matte-finished clear plastic placed on board which is overlaid with grid paper.
2. TEMPLATE LAYOUT
Template attached to building outline.
3. LAYOUT DRAWING
Diazo transparency produced by running template layout through printing machine and adding dimensions and data to transparency.
1a. EQUIPMENT TEMPLATES
Produced on photosensitive matte film.
1b. COMPLETED TEMPLATES
Dyed desired color, covered on back with double-faced cellophane tape and cut to size.
4. PRINT
Produced from Diazo transparent drawing.

...makes direct reproductions like this

Drawings Without Drafting

with photo-sensitive matte film. One drawing of a machine, bench, or other facility then serves as a master to produce templates for all similar units.

Each template is backed with double-faced cellophane tape, then attached to the layout sheet containing the building outline.

We make a transparency directly from the layout by running it through a standard printing machine. To get a clear transparency: Use very dark lines on the templates; put the layout through the printer slowly enough (long exposure) to burn out the color in the templates.

WHY COLORED TEMPLATES · We chose colored over uncolored templates because:

1. Colored layouts have greater eye appeal, are more easily "sold" to the boss.

2. Layouts are easier to understand when different types of facilities are different colors—racks green, benches orange, machines red, for instance.

3. Colored templates are easier to sort and select. They help engineers visualize layout arrangements, especially for large areas.

WHY MATTE-FINISHED PLASTIC · We use matte instead of glossy finish because it: (1) reduces reflection; (2) is easier to dye; (3) can be drawn on with pen or pencil.

WHY TRANSLUCENT TEMPLATES · Opaque colors print as black or dark gray solids. Translucent colors can be burned out, leaving only outlines.

ADDED FEATURE · Obviously our system saves time and man-hours. It has another advantage:

Suppose we're considering several equipment arrangements. We try one and print the layout. Then we use the same templates to set up a different arrangement and run off another print. And so on, for as many arrangements as we want. Usually we pick the best features of several proposals and combine them in the final template layout.

Participation like this ↑ is the secret of how to run a

Successful Recreation Program

Here's how Northrop Aircraft does it—and how you can do it, too, even if yours is a small plant. The secret? Know when to help, and when to keep hands off. And get everybody into the act.

THE NATIONAL AVERAGE for employee participation in industrial recreation programs runs around 18%. At Northrop Aircraft, Inc., Hawthorne, Calif., the year-round average is 40%. And last year it rose to a seasonal peak (in July) of 64.7%.

Such figures explain why Northrop doesn't think it's boasting when it lays claim to having a successful recreation program.

PAY-OFF • But just getting a lot of people interested isn't the only measure of success. Has it paid off in other ways?

Northrop believes it has. The company has a solid reputation in the Los Angeles area for being a good place to work. According to Aircraft Industries Association, turnover and absenteeism rates at Northrop are among the lowest in the airframe manufacturing industry. Management, of course, doesn't claim that its good record can be traced directly to any one thing that has been done. But the feeling is that the recreation program has been one of the important contributing factors.

What about production? Here's what Industrial Relations Director John Clark has to say:

"At one time during the last war, a friend remarked that our recreation program suggested we were running a country club. However, the record indicates that the more we played together in off-hours, the more we produced on the line.

"I am absolutely convinced of this: Good fellowship—the result of a strong recreation program—pays off in better production."

Clark suggests there's a correlation between these two facts: 1951 was the year of peak participation in the recreation program. And 1951 was the year in which Northrop received a special Air Force

commendation for "your December performance in the face of holidays and troublesome shortages.

BASIC PRINCIPLES · Northrop is a big operation, of course. But Charlie Boyle, manager of personnel activities and services, feels that the basic principles underlying the Northrop recreation program are applicable in plants of any size. He's now applying them in the company's new Anaheim division, where there are only 600 employees.

Here they are—Northrop's "five commandments":

1. Be sure you have the complete, sincere backing of top management.

2. Encourage a balanced, varied program—not top-heavy with sports like bowling and softball.

3. See that recreational activities are initiated by *employees*—not by management.

4. In all possible ways, encourage participation by employees' families.

5. Provide enough staff help to handle routine details—arranging facilities, equipment, and publicity, for example.

MANAGEMENT SUPPORT · A measure of management's belief in the importance of recreation is this: The manager of personnel activities and services shows up on the Northrop organization chart at the same level as the manager of labor relations, the personnel manager, the wage and salary administrator, and other department heads.

He has 10 people on his staff, including two assistant managers. About half the staff's time is spent on recreation. The rest goes to "services," which includes bond, charity, and blood bank drives, and a variety of other things like emergency loans, housing aid, securing hunting and fishing licenses, and vacation planning.

Salaries of the staff are paid by the company. But all other costs of the recreation program are paid out of the revenue from vending machines, chiefly coffee and soft drinks. Proceeds run about $4500 a month.

ORGANIZATION · Northrop is lucky to have Charlie Boyle to spark its program. He's a one-time showman, with a flair for getting along with people and a crusading zeal for better industrial recreation. He's the guiding force of the program. But it's far from a one-man show.

All recreational activities come under the Northrop Recreation Club, a no-dues organization to which all employees automatically belong. The club is run by a governing board, made up of "commissioners" (selected by each specialized club), and area representatives who are appointed by the board. There's a president and the usual complement of officers, elected by the board. One member of Boyle's staff represents the company.

In theory, the recreation club is autonomous. It runs the program on its own, except for advice on company policy. But in practice Boyle has found (as have most managements with successful programs) that things go better if he and his assistants take some initiative in suggesting ideas or smoothing the way for projects.

ACTIVITIES · At last count, Northrop had 30 different specialized clubs, ranging from archery and art through tennis and weight lifting. Bowling is the largest activity (1200 participants). Softball comes next (400 participants). But, if activities were limited to these and a few other big participation sports plus a few social events, Boyle feels that many employees would be left out in the cold. That's why he puts much emphasis on variety.

"When a man comes to us and wants to start a club, we tell him to find one other Norcrafter who's interested, and we'll back them," he says.

Result is that there are some unusual clubs. There's a Bible study group, for example, and clubs for fencing, bridge, flying, model railroading, gardening, sports cars, and goggle fishing. Once there was—Boyle swears—even a bull-whip cracking club, started by a lonesome Texan!

Mortality rate of the more unusual clubs (which may have as few as five or six members) is high, Boyle admits. But he feels you must be a realist and expect some turnover in recreational interests.

Club activities are only part of the Northrop program. In addition there are numerous picnics and dances. These are all on a departmental basis. Company-wide affairs were dropped. Too cumbersome. Result is that attendance has quintupled. There's an annual show (with 300 employees in the cast), an annual art show, and a Christmas doll and toy contest (entries going to orphanages).

To supplement organized activities, there's also lunchtime recreation—checkers, handball, and volleyball. And outdoor movies are shown for swing-shift workers at mealtime breaks.

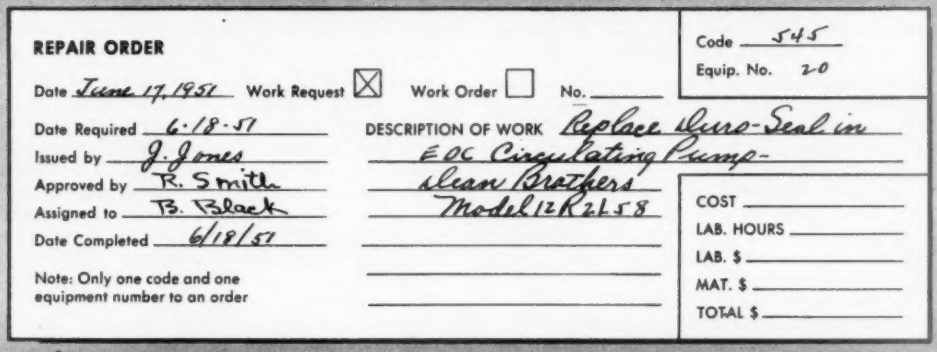
OPERATING POLICIES · Here's how Northrop solves some operating problems that commonly crop up in recreation programs:

1. Meeting places · These are provided by the company, where possible on company property, where necessary in rented facilities. Rent comes out of vending machine income.

2. Funds · The Recreation Club, once it has approved an activity, provides basic equipment. Bats, balls, and gloves for softball, for example. But employees must buy things like skis or cameras (though Northrop does provide the camera club with a darkroom).

3. Use of company time · This is an important issue. Monthly board meetings are held on company time, late in the day. And commissioners do some recreation business during their shifts.

But policy generally is to keep this kind of thing to a minimum. That's one big reason why Boyle feels you ought to have some staff help. They do the things that people would normally use as excuses for taking time off at company expense—like getting out announcements, buying equipment, and making arrangements for meetings.



REPAIR ORDER

Date June 17, 1951 Work Request ☒ Work Order ☐ No. _____

Code 545
Equip. No. 20

Date Required 6-18-51
Issued by J. Jones
Approved by R. Smith
Assigned to B. Black
Date Completed 6/19/51

Note: Only one code and one equipment number to an order

DESCRIPTION OF WORK Replace Duro-Seal in EOC Circulating Pump - Sloan Brothers Model 12K2158

COST _____
LAB. HOURS _____
LAB. $ _____
MAT. $ _____
TOTAL $ _____

FORM 2 • Maintenance work scheduling begins with this simple written order for every job. Operating supervisor delivers these orders to his area maintenance office. Here the principal maintenance foreman sorts them by major craft involved, after which operating supervisors sort each craft accumulation by priority. Then the scheduling engineer and principal foreman get in a huddle to arrange separate schedules for 10 to 15 maintenance foremen, who directly supervise crews of mixed crafts of about 14 men.

FORM 1 • Every afternoon the scheduling engineer gives each crew foreman this schedule for his next day's work. It tells him what jobs to plan for, and order of importance. Some jobs are keyed to a written job method. Assigned manpower is noted at the bottom of the form by craft code numbers. At the end of each day, the foreman returns his schedule to the scheduling engineer, after making entries shown. They include a report on the status of each job, jobs not worked, and jobs involving lost time.

With these two forms, Ethyl Corporation works out

Daily Maintenance Schedules for 1000 Men in 15 Man-Hours

By M. C. HUDGINS • Superintendent of Maintenance, Ethyl Corporation, Baton Rouge, La.

ALMOST TWO YEARS AGO we switched from a weekly to a daily scheduling system for maintenance work.

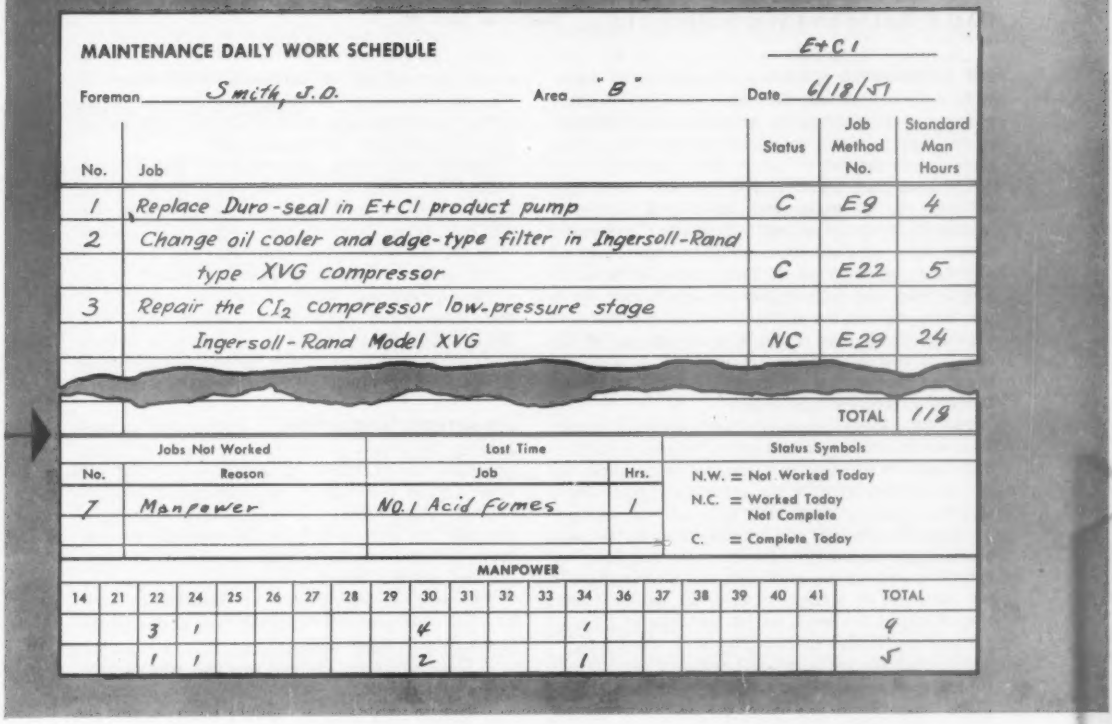
We first tested this idea in one area for a 30-day period in March 1950. The results were so good the plan now is used for our entire straight-day maintenance operations of some 1000 craftsmen.

Here are eight big advantages we've found:

1. Fewer upsets in scheduling • Everybody knows that the fewer interruptions you have in scheduling, the more efficient you will be. So we have a rule that no maintenance foreman can accept an unscheduled order unless the order is marked "urgent." Under our daily plan, the number of our "urgent" orders has been reduced to a minimum. Weekly "performance" reports go to the maintenance supervisors, showing their scheduling efficiency.

2. Less make-ready time • We lose less productive time in getting at the work each day. The daily schedule is issued to foremen early in the afternoon, so they can prepare the next day's work.

3. Quicker execution of work • The simplicity of our paperwork makes scheduling easier and faster. The daily schedule, in contrast to the old weekly schedule, is always up to date. Hence, if needed, we can insure a minimum loss of time between



MAINTENANCE DAILY WORK SCHEDULE E+C1

Foreman Smith, J.D. Area "B" Date 6/18/51

No.	Job	Status	Job Method No.	Standard Man Hours
1	Replace Duro-seal in E+C1 product pump	C	E9	4
2	Change oil cooler and edge-type filter in Ingersoll-Rand type XVG compressor	C	E22	5
3	Repair the Cl_2 compressor low-pressure stage Ingersoll-Rand Model XVG	NC	E29	24
			TOTAL	118

Jobs Not Worked		Lost Time		Status Symbols
No.	Reason	Job	Hrs.	N.W. = Not Worked Today N.C. = Worked Today Not Complete C. = Complete Today
7	Manpower	No.1 Acid Fumes	1	

MANPOWER

14	21	22	24	25	26	27	28	29	30	31	32	33	34	36	37	38	39	40	41	TOTAL
		3	1						4				1							9
		1	1						2				1							5

writing a job order and executing it in the field.

4. Work done in order of importance · Our system enables *operating supervision* to establish priorities each day on job orders. From these decisions we develop the next day's schedule.

5. Proper stress on preventive maintenance · Under the daily plan it's impossible to by-pass the important functions of preventive maintenance, because they appear on the daily schedule. They include, primarily, lubrication and inspection.

6. Better supervision by foremen · The system gives maintenance foremen more time for field supervision and work planning. The reason: They now work from pin-pointed schedules instead of a mass of job orders.

7. Better coordination with operations · Through the daily copies of work schedules they receive, operating supervisors know what's going on each day. They see what maintenance work is necessary. Also, they can check to see that their priority recommendations are being followed.

8. Lower manpower requirements · This obviously stems from the other advantages. We can't evaluate it because of other concurrent improvements in centralization of shops and stores facilities that contributed to a definite manpower saving.

PROBLEMS WE SOLVED · Maintenance job scheduling on a weekly basis got tougher for us as the plant grew in size. Often we had to revamp a schedule before the end of the week to meet changing needs of the operating departments. What to do? Develop a new system? Overhaul the old?

Whatever the decision, we had to answer some basic problems that will always exist in scheduling:

Flexibility · Unforeseen factors can crop up at any time and bog down the most efficient schedule if it doesn't have the proper elasticity.

Best way · Schedule makers are forever faced with the challenge to improve job-planning methods so as to get work done faster.

Best time · Efficient scheduling calls for good liaison between the maintenance and operating departments to get each job done at the right time.

Least paperwork · No system is good that will bury the maintenance foremen under a landslide of paperwork. Also, an acceptable system must call for a minimum of paper preparation. Yet it must provide the information needed for efficient and economical performance of work in the field.

After several months' research and study of various plans in use elsewhere, we decided to try daily scheduling. It works.

Turn the page

THE SWITCH-OVER · When we changed from weekly to daily scheduling, we added four junior engineers to our department. Otherwise our maintenance organization remained intact. No extra clerks were needed.

The four new junior engineers were hired specifically for planning and scheduling purposes. Theirs, however, is not a full-time job. They apply about 50% of their time to the preparation of standard job methods in the particular area in which they are responsible for scheduling. It is our thinking that the duties of these engineers provide excellent plant training for openings in direct-line maintenance supervision as they occur. Such promotion has occurred in three instances already during the past year.

The four junior engineers work under a supervisor of planning and scheduling and his assistant. The supervisor and his assistant used to do all this work themselves in the old weekly plan. Their responsibilities at that time included maintenance of manpower records and transfer records (to meet contractual seniority agreements), handling of special maintenance problems, and preparation of job methods on a limited scale. In the new plan they dropped the work on job methods to take on supervisory duties in planning and scheduling.

Job methods are developed monthly by the four junior engineers. These men act as area engineers—each one serves one of the four geographical areas of our plant. Three are process areas; the fourth is called "central shops."

Our maintenance work force is divided into three separate groups (each serving one of the three process areas), plus a construction and a central-shops group. Each of the five groups is directed by a maintenance supervisor and two assistants, who report directly to the superintendent of maintenance and an assistant superintendent. Under these group heads comes a principal foreman who directs from 10 to 15 maintenance foremen. Each maintenance foreman supervises a crew of about 14 "wage-roll" craftsmen.

The size and the make-up of a crew are not inflexible. We vary the manpower and craft cross-section to some extent to fit the daily workload, but try to keep it as nearly constant as possible.

Obviously, our breakdown of physical plant and maintenance forces into four separate areas simplifies our task of daily work scheduling. We have never operated our maintenance forces otherwise. And in these days of specialization of methods, skills, and equipment there is all the more reason to profit from such an arrangement.

Construction work performed by Ethyl forces (about 200 men) is still scheduled on a weekly basis. There's a good reason. Construction work is different from maintenance work—it is planned with the aid of definitive estimates and design. It is not subject to the daily upsets or delays by operating conditions. Weekly schedules prepared by the construction supervisors usually hold well. These schedules are based on priorities on authorized projects obtained from operating supervision in the area involved.

JOB-METHODS DESCRIPTIONS · Written job methods play an important part in making the new system effective. As of March 1, we have put 223 into effect. Each one had to be field-tested and approved. Also, many of them have since been revised. Our goal is to have job-methods descriptions for all recurring maintenance jobs throughout the plant.

Job-methods descriptions are identified by number, title, and area applicable. A typical description is made up in three parts:

1. General items, such as permits, special tools, material required.
2. Special or important safety rules to observe.
3. Step-by-step procedures. This part concludes with notations on average downtime of equipment, and standard number of man-hours required.

Man-hour standards have been based until now on estimates and performance, but are now being developed on work-measurement principles. Each methodized job description will give a craft-by-craft breakdown of standard man-hours. Right now the maintenance foremen and scheduling engineer have to supply this breakdown on the basis of experience. To provide a check on the efficiency of field work, labor and material costs are compiled for all work on which job-methods descriptions have been issued.

Job-methods descriptions are simplifying our job of planning and scheduling maintenance work because all you have to do on the schedule is refer to the description sheet number. This number is keyed by a letter prefix to the area. Now we'll show you how it's done.

How Ethyl's Scheduling Plan Works

WRITTEN JOB ORDERS · The mechanics of daily planning and scheduling are fairly simple.

In the first step, supervisors of operating departments write simple repair orders (see form on page 92) and place them in a "schedule" box in their maintenance area field office. It is here that daily work schedules are prepared. (On this form "Work Request" differs from "Work Order" only

in cost of job and authority for approval. This is an accounting distinction which doesn't affect work scheduling.)

COORDINATION PROCEDURE · Next, the principal area maintenance foreman lifts orders from the box and breaks them down craft-wise under the respective parts of his operating area. This takes him about 20 minutes. He ends up with a pile of orders, sorted first by operating area, then by major craft involved. These orders are consigned to slots marked for each breakdown. *Time for 4 areas: 80 minutes.*

Immediately after him come designated operating supervisors who check the work orders from their own areas, and reshuffle them according to job priorities. Priorities are established by crafts to eliminate scheduling confusion. This takes about 20 minutes. *Time for 4 areas: 80 minutes.*

A word here about multi-craft orders. Orders are filed in the maintenance area field offices according to the major craft involved. We don't write duplicates. We don't need to, because our maintenance foremen supervise mixed crafts. However, we do prepare "cross-orders" for jobs being sent to our central shops. These orders accompany the part to be worked on so that time put on them in the shop will be charged correctly.

MAKING UP THE SCHEDULE · The planning and scheduling engineer and the principal foreman together now make up the daily schedule for their own area. They draw up a separate schedule for each maintenance foreman, as shown in the figure on page 93. See how it lists the jobs in the order in which they are to be done. It shows the estimated or standard (if available) manhours for each job, and the job-methods reference number.

This scheduling procedure goes on concurrently in each of the four plant areas, and takes about 90 minutes. *Time for 4 areas, 2 men in each: 720 minutes. Total time for scheduling: 880 minutes, or 14 2/3 man-hours.*

Now you may ask, how do we schedule each day's work efficiently with a mixed craft crew? Keep in mind, our *first* regard is for priority of jobs. However, we schedule enough work from a craft standpoint to keep all the craftsmen busy.

We do this by scheduling small craft jobs to fill in the gaps between major jobs. Normally a maintenance foreman will have three or four jobs going at one time, with an equal number of crews. When many small jobs are necessary, he may handle six or more jobs, each with smaller crews.

Let's assume a maintenance foreman is supervising a major job requiring four separate crafts, one of which is needed for only one hour. He checks his schedule and arranges to send these one-hour men to another job they can handle. We find this method works quite well—there is a minimum of juggling of manpower within any one foreman's personnel during the day.

HANDING OUT THE SCHEDULE · From the working copy we make up final individual schedules in quintuplicate. The original copy is reviewed with each maintenance foreman in time to make arrangements for him to order the necessary materials, special tools, and equipment, and have them delivered beforehand to the job site.

The second copy is kept by the principal area foreman. Thus he can constantly check the progress of work scheduled for his foremen—they number 10 to 15, depending on size of area.

The third copy goes to the operating supervisor involved, to acquaint him with the work planned in his area for the next day.

The fourth and fifth copies are retained by the planning and scheduling engineer.

NON-SCHEDULED JOBS · Operating and maintenance supervisors cooperate to prevent interruptions to schedules, and thus to keep down lost time. But, should emergency work arise, the maintenance foreman has standing authority to remove his men from scheduled jobs as needed.

To exercise control over non-scheduled jobs, we require the maintenance foreman to describe such jobs on the back of his schedule, and to note the time spent on them.

DAILY REPORTS · At the end of each day shift, each maintenance foreman turns in his work schedule for that day to his scheduling engineer. On it he marks the status of each job—whether "C" (complete today), "N C" (worked today, not complete), and "N W" (not worked today).

On "N W" jobs he gives the reason in a special box on the form. Also, in another box he lists the number of any job involving lost time, and reason. These data not only help the scheduling engineer to adjust his schedules, but also point the way to better job methods or tools.

WEEKLY REPORTS · From the daily reports the four scheduling engineers draw up weekly reports for top maintenance supervision. Purpose is to show the effectiveness of scheduling. These reports show the percentages of scheduled jobs worked (1) to total jobs scheduled, and (2) to all jobs worked.

These reports also review the status of all maintenance work. By this we mean, the total number of repair orders on file, by craft. This total, of course, doesn't reflect the man-hour backlog.

MAN-HOUR BACKLOG · We determine the actual man-hour backlog every three months, on the basis of estimated man-hours to perform the repair orders on hand. To these we must add estimated man-hours to do work not actually on written orders. Such work is determined by a physical survey of field equipment made jointly by maintenance and operating supervisors. Thus we get an indication of the trend in man-hour requirements that leads to better long-term scheduling.

IDEAS OF THE MONTH *for*

By LEWIS K. URQUHART • Managing Editor

GO WASH YOUR FACE! is National Cotton Council's suggestion for reducing fatigue and increasing efficiency. The idea is this — and we buy it: Washing face and hands opens up pores. Drying with a towel — cotton, of course, if you want NCC to be completely happy — stimulates circulation, speeds oxygen to cells and muscles, thus restoring energy. Adds NCC, "What picks you up, picks up your employees."

WITH FIBREGLAZE you can kiss your putty troubles good-bye — because it remains elastic indefinitely, can be removed without damage to sash or patience after years of wear. A trial 5-gal. pail will set you back $3.35 per gallon. Thomas K. Chaffee Co., Providence 1.

SPEAKING OF WINDOWS, there's Shade, a vinylite plastic sheeting. Cut it to size, apply it by wetting the glass, squeegee the water out — and you've got sunlight without glare. Washable. Easily stripped off. In eight colors. Transeal, Ltd., 821 North Ave., Plainfield, N. J.

A THIRD HAND, says Bellows Mfg. Co. (1017 N. Central Expressway, Dallas) of its new vise. Mebbe the answer to many holding problems in industry. Can be quickly converted from bench use to holding tool for drillpress or milling machine. $39.95.

FLAME-PLATING with tough tungsten carbide is a new way to hard-coat ordinary metal surfaces. Process doesn't warp base metal or affect its qualities. Linde Air Products Co., New York 17, does the job in its own plant. Applications unlimited—plug gages, saw blades, draw dies, cotton-picker spindles, slitter knives, wear strips.

NEW DIP SOLVENT cleans and reactivates a motor in 10 or 15 minutes, says Northwoods Mfg. Chemists, Inc., Porterfield, Wis. Seems all you do is dunk motor in a tank of "EMC," switch on the juice for 5 minutes, break the current, dry motor with a blast of compressed air.

BOOKLETS OF THE MONTH — the seven from Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 22. Each is titled "Getting the Most Out of Stainless Steels" in a particular industry — food, dairy, meat, brewing, chemical, textile, pulp and paper. Free, of course.

RUST PREVENTION AND DEBURRING in one and the same operation! A plant that makes steel washers performs this simple feat with a deburring barrel and something called Magnus 26N. You can get the dope from Magnus Chemical Co., Garwood, N. J.

MARKOPRINTER automatically prints display copy on sides of shipping cases at the packing point. Works equally well on corrugated, fiber, and wood. Prints from one to five sides. Eliminates need for preprinted cases. Adolph Gottscho, Inc., 188 Duane St., New York 13.

Factory Executives

ONE THING GROUCHO MARX didn't mention about Voicewriter (Sept., p. 96): Thomas A. Edison, Inc., West Orange, N. J. has one you carry in a briefcase.

CIRC-L-SCALE is a handy, dandy combination compass, scale, square, protractor, and lettering guide. On the back: temperature conversion table, decimal equivalents, tap and drill table, metric. Free. Unistrut Products Co., 1013 W. Washington Blvd., Chicago 6.

SHOOTS STAPLES that clinch in mid-air! That's the headline from Bostich, (Westerly, R.I.), which has a new stapler that will clinch materials even when there is no backstop surface. (Actually developed by Gustin-Bacon Co., Kansas City, Mo., to make it easier for contractors' men to apply glass-fiber blanket insulation.)

TAG YOUR FIRE EXTINGUISHERS with easy-to-read instructions for use. And get your tags — five kinds, each for a different type of extinguisher — from Fyr-Fiter Co., Dayton. They're free.

OCTOBER BEGINS THE HEATING SEASON — and reminds us that Herman Nelson, Moline, Ill., make portable heaters to help you solve your emergency heating problem. Ask for "Heat on Wheels for Industry."

LEAVES ON YOUR LAWN? Mulch-Vac is a new machine that sucks up wet or dry leaves, cuts them into a fine mulch, blows the mulch back to the ground (or collects it in a bag). Self-propelled. Will clear 6 acres in 8 hours. $450. Atwater-Strong Co., Atwater, Ohio.

FIBROK is a non-metallic, perforated material recently announced by Pearson Industries, 4554 N. Bdwy., Chicago 40, as an alternative for metallic perforated sheets. May be stapled, nailed, glued, screwed, cut with shears, etc. Name your color.

ANOTHER HOLDING TOOL is three tools in one — plier, cutter, wrench. Its maker, Sargent & Co., New Haven 9, calls it the "mechanical hand." In 4½-, 5½-, 6½-, and 8-in. sizes.

FIRE DANGERATER is free. Turn dial to find out — in seconds — if record protection you now have is enough to protect your important records in case of fire. Mosler Safe Co., 320 Fifth Ave., New York.

WE LIKE THE SAFETY GUARD made of shatter-proof Plexiglas swivel-mounted on a permanent magnet, which holds the guard securely in place in any desired position on a machine base. Ask Dilley Mfg. Co., 1626 Ansel Road, Cleveland, about its Magnetic Grip-Shield.

ANODIZED ALUMINUM isn't new — for small parts. Now Grumman Aircraft Engineering Corp., Bethpage, N. Y., has come up with a brand-new way to anodize large surfaces.

JOB KNOWLEDGE SCORECARD			CORRECTLY AND IMMEDIATELY		CALLED BACK WITHIN			
	QUESTION	ANSWERED BY	100	WRONG 0	HOUR 85	DAY 70	WEEK 55	SCORE
1		JONES	✓					100
2		CALLAHAN				✓		70
3		BROWN					✓	55
4		HAMILTON	✓					100
5		SMITH				✓		70
6		ADAMS	✓					100
7		GORDON	✓					100
8		WRIGHT	✓					100
9		DEMPSEY			✓			85
10		WILSON					✓	55
							AVERAGE	83.5

STEP 1 **ASK YOUR KEY MEN QUESTIONS** about their operations and activities. Score them—this simple form will do—on accuracy and speed of answers. (Don't record your questions if it seems to be too much bother.)

How Work Sampling Can Help

Here's another way you can use the work sampling technique with profit. It's one of many uses suggested in FACTORY's discussion of this versatile tool (July 1952, page 83).

By E. H. MAC NIECE • Director of Quality Control, Johnson & Johnson, New Brunswick, N. J.

THIS IS NOT AN IDEA AIMED at increasing your already heavy work load. Instead, I'm going to tell you how to use the work sampling technique to simplify one of your important duties—*evaluating the job knowledge of the key men who work for you.* This sampling technique should help you do three things better:

1. Discover where a lack of job knowledge threatens the success of your team.

2. Guide the training and development of the management ability of your subordinates.

3. Make decisions faster, more confidently when you have to select men for promotion, transfer, and reorganization.

The idea is to keep score, by a simple method, of the answers you get when you ask your key men questions related to their responsibilities.

Every day you normally ask several, if not all, of your key men for information about their operations and activities. You expect correct answers promptly, if not immediately. You use the answers in the performance of your own job. You can also use them to form opinions about the management abilities of the men who give you the answers—by the accuracy and promptness with which they respond.

WHAT KIND OF QUESTIONS? Include only those related to the individual's work that you would normally expect him to answer immediately.

Don't judge him on questions unrelated to his job—such as the date of the battle of Waterloo.

Eliminate from the scoring all questions that require decisions or judgment. A question that starts with "What would you do if" is one that asks for judgment, but I think it's impractical in the evaluation. There are several standard practical judgment tests you can use to evaluate an individual's ability in judgment. Here are samples to show what types of questions you should use:

Include: "Can product X be run on machine number 6?"

Exclude: "How many parts were shipped on order number 17034 last week?" (Assuming the answer is something like 3074.)

HOW MANY SAMPLES? The by-product of your questioning is really a sampling of the job knowledge of these men. Each answer is a sample of the individual's job knowledge.

How many samples (work sampling observations) do you need to get a reasonably accurate evaluation of an individual's job knowledge? I haven't attempted to calculate the statistical accuracy of sample sizes. This is a continuous process. You build up a mass of data as you go along. Cer-

SEMI-ANNUAL SUMMARY

		MARCH	APRIL	MAY	JUNE	JULY	AUGUST	AVERAGE
1	JONES, FOUNDRY	100	100	85	100	100	100	96.6
2	SMITH, MACHINE SHOP	70	85	85	100	100	85	87.5
3	WILSON, PLATING	55	70	100	85	100	100	85.0
4	ADAMS, ASSEMBLY	100	100	100	90	100	100	98.3
5	GORDON, SHIPPING	100	100	100	100	85	100	97.5
6	BROWN, WAREHOUSE	55	85	90	100	70	100	80.0
7	CALLAHAN, PLANT ENGR.	70	70	100	85	100	85	85.0
8	DEMPSEY, PROD. CONTROL	85	100	100	100	70	100	92.5
9	HAMILTON, PERSONNEL	100	100	70	85	100	70	87.5
10	WRIGHT, INDUSTRIAL ENGR.	100	85	100	100	100	100	97.5
	AVERAGE	83.5	89.5	91.0	94.5	92.5	94.0	90.8

STEP 2 **SUMMARIZE DAILY SCORES** to get a running picture of each key man's job knowledge. (No heavy thinking required—your secretary can do this for you.) You may prefer to keep a separate score sheet for each man.

You Rate Your Key People

tainly I wouldn't use one question to decide the extent of anyone's job knowledge. Matter of fact, I wouldn't think of forming even a tentative opinion with a sampling of less than 10 questions, followed by 10 more that confirm the results of the first sampling.

Don't worry about the relative degree of difficulty of the questions—they average out.

KEEPING THE SCORE • So far, I haven't asked you to do anything you aren't doing now. But, to make job knowledge evaluation objective, you should keep a running score of how your key men answer the questions. The scorekeeping can be simple, so don't let it scare you.

Have your secretary make up a form like the one on the opposite page. It provides a way to keep a running record of the questions you asked, the name of the individual, and how accurately and promptly he answered the question. If you want, you may omit recording the question. However, I find it's helpful to have that when you want to talk with the individual about his development, or to plan his training. Use your own system of shorthand to simplify recording.

Your secretary can summarize these daily scorecards into a record like the one above. It gives you a quick picture of the job knowledge standing of each individual over a period of time.

There's one variation of the scorekeeping method that you may like better. Instead of using one form to keep score on the questions and answers, you can use a separate score sheet for each individual. But if you have several people to check, you'll have to shuffle several papers as you reach for the phone and a scorecard.

I know you're curious to find out where I got the numbers used to rate the answers. I selected them arbitrarily after experimenting with the system. I started with 100 for answering a question correctly and immediately, zero for every other type of answer. But I found I needed the gradations to help me evaluate individuals better.

SO WHAT? Your evaluations will serve no useful purpose if nothing further is done about them. Unless this sampling technique is used for constructive executive development, there is no great advantage in it. But if you use the results obtained by job-knowledge evaluation along with other measuring devices, the method will help you develop your management team. Use it to coach, counsel, and find areas where training and development are needed.

A word of caution: Job knowledge is important when it comes to managing an operation. But it isn't everything. If one of your key men has consistently poor scores, examine other records of his performance to see if his lack of job knowledge reflects his relative effectiveness as measured by other means. I've found it generally does, but there may be exceptions.

To see how, by work sampling, you can accurately size up key people in your organization, turn the page.

How Author MacNiece Sized Up Typical Key People

The work sampling application I've described on the two previous pages won't do anybody any good without proper follow-up. So the next step is to figure out *why* some of your key men didn't win any cigars—and *how* you can help them come closer to ringing the bell.

Here are some actual cases out of my experience. Names, for obvious reasons, are fictitious. You'll see how work sampling uncovered some mighty interesting personality traits and helped me understand these people a lot better.

TOM WHITE is likely to beat around the bush. He will not have thought much about the problem or situation in question. But he knows that, if he keeps talking, some of the parts of the problem will fall into place. He is much like the woman who said, "How can I know what I think until I hear what I have said?"

Some interesting thought patterns develop in which the word *if* is many times repeated. Suppose, for example, you asked a man like Tom if the people in his department would like to have the Friday following Thanksgiving off. He'd probably state that *if* they've been working overtime they'll probably like it. *If* notice is given far enough in advance, many will take long out-of-town weekends. But you still do not have the answer.

Another better-informed individual would answer, "Yes, because they've been favorable to long week ends in the past and they realize that the work will still be here for them when they return." He'd probably add that he had asked a number of employees about this possibility and found them to be receptive to it.

MIKE FULLER is one of those people who like to talk—particularly to their chief. If you ask them what time it is, they will try to tell you how to make a watch. They are the ones who write 20-page reports when one or two pages are enough. This is a personality trait, and care must be taken not to injure the good social adjustments of these conversationalists.

First try to let Mike know that there is a time and place for lucid intervals. After the answer has been given, and more talk is added to stretch out the conversation, say: "Mike, I'm on the tight pulley today—let's have lunch later in the week when we really have time to talk about things and stuff."

Try to train such a person to summarize his reports and start out with short but complete statements. Details can follow in the order of their importance, so the reader can stop when he has enough information. Explain to this type of person that answers to questions, like reports, should lead off with simplified, concise summaries. This can be followed by as much detail as is asked for. Let him know that too much detail in an answer often leaves the questioner in doubt as to whether the question was really answered or only talked about.

BILL ELDER shows up poorly in conferences, but really is exceptionally well informed. He is the modest type who does not like to parade his knowledge before others. When others make false statements in conferences, he will think that they and others should recognize the fallacies, but he will not point them out. This type of man needs to be told that he must make a better impression on others by sound arguments and active participation in discussion. He need not be contentious in his approach. When a fallacious statement is made, he can lead his arguments with "Wait a moment! Have we considered this or that aspect of the situation?"

ROGER PINE ranks high in operating effectiveness when measured by other means. But he generally ranks an 85 when measured by the Job Knowledge Test because he usually calls you back within an hour. He is the type that cares little for details but is highly skilled in organization and delegation. He does not burden himself with details, but his lieutenants know all the answers. He paints with a broad brush and knows how well his operations are running in general terms. It may be unwise to try to change him. Nothing should be done that will degrade his organization arrangement or ability. Perhaps he may need some summary information fed to him currently.

JOHN DOE always gets a low score. He may be a new member of the team who has not learned much about his job or his company. Or he may be an old employee who has never had the interest to learn the lessons of the job. In either case, executive development can be started by giving him some of the company's catalogs to read. Give him the product specifications and blueprints for items made by his department. Suggest that he have lunch with a member of the sales department and find out how the items he produces are used, how well they hold up functionally, and how well they are accepted in the market place. Get him to talk to men from research, purchasing, planning, engineering, and other departments. Then watch his job knowledge score and his operating effectiveness improve. And maybe some day he will be a well-developed executive.

CASES IN METHODS IMPROVEMENT

BIRTMAN ELECTRIC COMPANY, Rock Island, Ill.

A $3,000 Flier in Work Simplification Pays Back $100,000 in 2½ Years

By **JAMES E. ALLEN**, Coordinator of Work Simplification Program, Birtman Electric Company, Rock Island, Ill.

OUR WORK SIMPLIFICATION PROGRAM has been in operation just about 2½ years.

Number of proposals submitted to date: 706.

Number accepted: 308—none of them major projects and no one of them saving a great deal of money.

Results: a saving of almost $100,000.

Tooling cost: only $2978.

We think that's wonderful for a program still in the development stage. But it's not the whole story. We don't think that the real value to us can be fully expressed in dollars and cents. For example:

As a result of participating in the program, our tool designers now automatically use the principles of work simplification in developing fixtures, tools, and jigs. They use quick-acting clamps instead of screw clamps. They combine fixtures to eliminate the need to transfer parts from one fixture to another. And so on.

Our product designers automatically give attention to machining and assembly details. In other words, they are conscious of the production men's problems.

Also, we now realize the necessity for developing the best possible processing and assembly methods for manufacturing a new product, and training our workers in these methods, before releasing it to the shop. We can't give you a dollar figure for the eliminated confusion and delay, but it's a big one.

Just talking work simplification, we found, won't work. Before we learned the work simplification "facts of life," we tried an unorganized approach. We held occasional meetings to encourage our supervisors to turn in their ideas for methods improvements to the industrial engineering department. For a while we got a few good ideas. Then, despite impassioned pleas on the need to cut costs to meet competition, the suggestions tapered off.

This unhappy experience taught us two things: There was gold in the individual and collective minds of our supervisors. And we needed an organized approach to get at it.

How we developed our program

First step was to assign one of our time study engineers with particular interest in work simplification as coordinator for the program. That happened to be me. My job was to help supervisors develop their proposals, review and acknowledge all proposals, estimate the savings, and develop the training methods.

We then built a combination work simplification lab and conference room in the factory. It's equipped with workbenches, blackboards, outlets for power tools, etc.

Next we reached three important conclusions:

1. We'd ask supervisors and their assistants, engineers, draftsmen, and certain staff and office employees to participate in the program.

2. We'd get better results by holding small (10 to 12 men) meetings, rather than having all participants (40 to 45) in at one time.

3. We'd hold a regular one-hour weekly meeting for each group on company time. (Small size of groups means we don't keep too many supervisors away from their jobs at one time.)

It was agreed that a committee of six participants in the program would review the proposals that we hoped would be submitted, and recommend action to management. Each month one person is dropped from the review committee, and a new member added.

Finally, we decided that a top management man would attend all meetings—to demonstrate management's active interest and support, and to aid in the consideration of proposals.

To learn how Birtman Electric introduced its work simplification program—and keeps interest in it alive—turn the page.

How we introduced the program . . .

We built up enthusiasm for the program by showing a series of movies on what other companies had done. We pointed out the need for methods improvement to keep our operation progressive and competitive.

Next we explained how we hoped the plan would work. We reasoned with the participants, noting that if other companies could bring about savings of time and money through methods improvement, so could we.

Projects were begun. First we trained our people in the use of process flow charts. We developed sample flow charts in our meetings, and the group analyzed them. Then we asked each participant to develop a flow chart for some part in his department, analyze it, and report on his findings at the next meeting. We suggested that, if possible, he put his report in the form of a work simplification proposal.

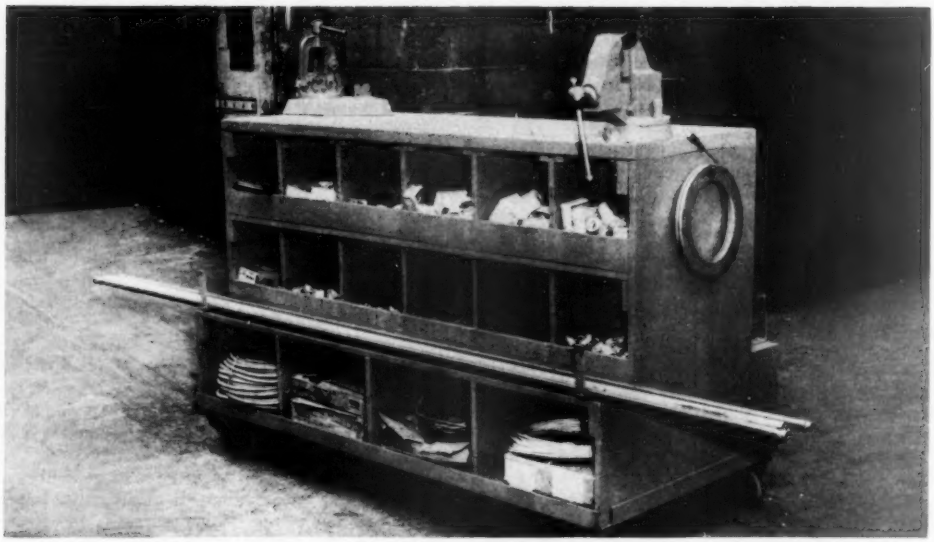
From time to time the coordinator of the program brought in flow charts for analysis by the entire group. These charts covered the progress of one part as it traveled through four or five of our departments.

Results were good. A number of worth-while proposals were submitted. We really had the ball rolling. And, best of all, enthusiasm was running high among participants in the program.

We then introduced the analysis of right- and left-hand motion. We used the same general instruction methods as in previous sessions, analyzed sample operations, and asked each participant to develop charts of his own for review by the whole group.

We also emphasized the important things to watch for in trying to spot areas needing work simplification. For instance: only one hand working while the other held the part, repeated picking up and putting down of tools during the operation, transfer of a part from one fixture to another, etc.

IMPROVEMENTS LIKE THESE 15 BROUGHT BIRTMAN



Problem • Eliminate need for maintenance electricians to return to their shop for ladder, tools, and supplies.

New way • Specially designed truck holds all equipment maintenance electricians might need on jobs.

Savings • Eliminated an estimated half hour of walking per day by 3 maintenance men—a total of 1½ man-hours per day. Cost to build: $53.

. . . and how we are keeping enthusiasm for it alive

We are now working on two other approaches to work simplification, using the participants' background in working up flow charts and motion charts. One session each month is devoted to simplifying production jobs that require the operator to walk more than two steps. Each supervisor looks for such jobs in his department, makes up the necessary charts, and brings them to the group meeting for analysis. Soon we plan to analyze walking on non-productive jobs.

Another session is spent analyzing materials handling problems. At present we are working on over-all plant handling problems, in hopes that supervisors will apply experience gained in the meetings to their own departments.

That's where the program stands now. Future projects: elimination of full body motions, bending, squatting, etc.; elimination of all hand trucking; use of man-machine charts.

Maintaining enthusiasm and interest is management's biggest job. Here's the formula we go by:

1. Management must take an active part by attending all meetings, emphasizing constantly the importance of the program to company welfare.
2. We show movies, from time to time, of work simplification projects in other plants; and take before-and-after movies of some of our own improvements.
3. We keep our instruction at the "small dose at a time" level; vary our instruction methods as much as possible.
4. We maintain an up-to-date chart in the lab showing the number of proposals received and accepted, plus estimated annual savings.
5. We constantly ask our people for their suggestions on how the weekly meetings can be made more interesting.
6. We make a point of publicly commending participants for their contributions—but give no prize or bonus for an acceptable suggestion.

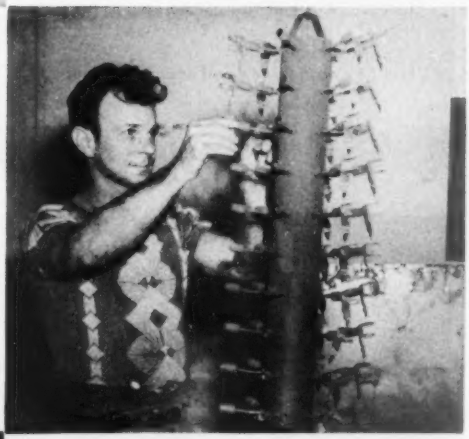
SAVINGS THAT ADDED UP TO $100,000

▲ **Operation** • Assemble handle to clamp.
New way • Drill hole in clamp and handle. Assemble with drive pin (tight press fit).
Old way • Drill hole in clamp and handle. Countersink hole on one side of clamp; tap other side. Assemble with bolt; screw bolt into place.
Savings • A 22% increase in production—from 294 assemblies per hour to 361. Eliminated high cost of taps; replaced bolts with much cheaper pins.

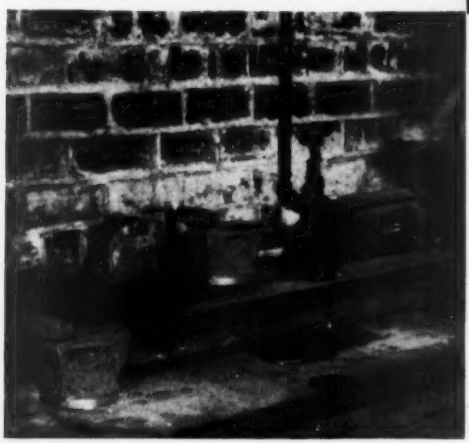
◀ **Operation** • Assemble two pins into bolt.
New way • Two pins are inserted in bolts. Bolts are placed, two at a time, in a fixture in an air-operated vise which forces pins into place. Vise made from obsolete equipment for $15.
Old way • Pins were inserted in one bolt at a time, pressed into place with a hand-operated vise.
Savings • A 54% increase in production—from 195 pieces per hour to 250.

Turn the page

Operation • Assemble sleeve and jam nut to 3-in. stud.
New way • Pick up stud in each hand and place in air-operated fixture. Clamp studs in fixture with foot trip. Pick up sleeve in each hand; place on stud. Pick up jam nut in each hand; place on stud and tighten with fingers. Release foot trip, opening clamp and dropping studs onto trough to parts box.
Old way • Hold one stud in left hand; put sleeve and nut over stud; tighten. Put in parts box.
Savings • A 50% increase in production—from 240 to 360 per hour.



Operation • Spray-paint indicator arms.
New way • 60 indicator arms are hung on a "Christmas tree," run through an electrostatic paint booth on an overhead conveyor. The "tree" cost $75 to build. We had idle electrostatic equipment in the plant, which was utilized in making this improvement.
Old way • One indicator was hung on a hook, which was held in the operator's hand. He operated a spray gun with the other hand.
Savings • A 200% increase in production—from 245 to 750 per hour.



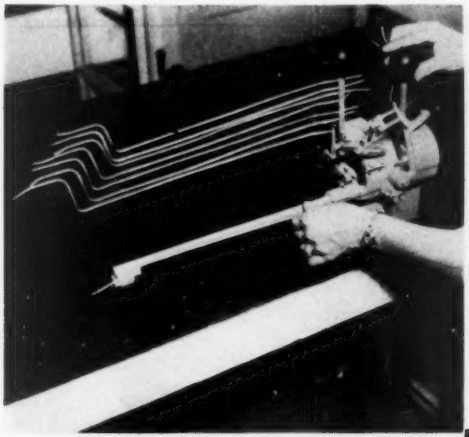
Operation • Press apart body and jaw of vise after they're cast. Operation necessary because body and jaw are cast in one mold. U-beam is fused to jaw, not to body. But it sticks hard to body. Problem: Separate U-beam from body.
New way • The vise is held in a fixture. An air cylinder rams the U-beam-jaw unit out of the body. Cost of fixture and air cylinder: $154.
Old way • U-beam and jaw forced out of body with hand-operated arbor press.
Savings • A 125% increase in production from 25 to 56 per hour. And we eliminated one of the most fatiguing jobs in the shop.

Operation · Wind electrical heating element ribbons on core; lace end of ribbon through hole in core; fold it over so that ribbon won't unwind.
New way · Series of three rollers (see arrow) holds and keeps tension on ribbons, frees operator's hand to lace and fold during next machine cycle (12 seconds). Roller assemblies cost $50.
Old way · Operator kept tension on ribbons with her hands, had to lace and fold separately, with machine idle.
Savings · A 35% increase in production—from 59 to 85 elements per hour.

Operation · Dip parts in cosmoline, wrap each in rust-proof paper, and pack.
New way · Eight parts are placed on rack, dipped in tank. After dipping five racks, operator moves to wrapping bench, pulls sheet of rust-proof paper over wrapping jig shaped to fit part. Part is laid on paper, which folds around it. Wrapped part is put in carton on conveyor next to wrapping bench. When 40 parts are in carton, it's sealed and pushed into wooden box at end of conveyor.
Old way · Parts dipped singly, wrapped on flat table. Haphazard packing.
Savings · A 62% increase in production.

Operation · Paint five stencils on three sides of a wooden case.
New way · All five stencils combined in a right-angle fixture which fits box. Operator holds fixture with one hand, brushes with other hand.
Old way · Operator picked up first stencil, positioned it, brushed, laid it down; then repeated with four other stencils.
Savings · A 35% increase in production—from 34 to 46 boxes per hour. Brushing still takes same amount of time. Saving is in picking up and putting down one stencil instead of five. Method insures accurate placement of stencils.

Turn the page



Operation · Bend conduit tube (4 bends must be in exactly right places, have exact radiuses).

New way · Closing clamp at left of fixture makes first shallow bend. Clamp just above operator's wristwatch in picture is closed, and lever in her right hand makes second bend. Lever at left forces conduit against jig, making third bend. Clamp at top of jig is closed, and lever at right (partly hidden by operator's right hand) makes final bend.

Old way · Conduit bent around pins in a round fixture with the fingers.

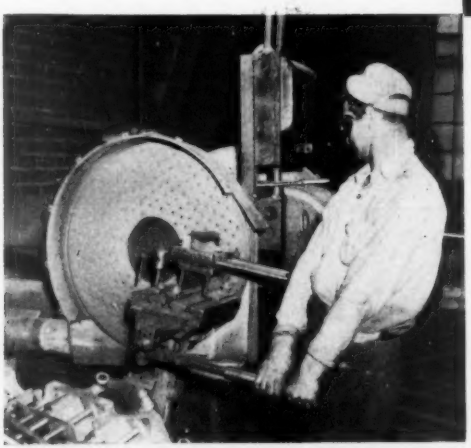
Savings · A 32% production jump—from 38 to 50 per hour. Constant accuracy cuts shrinkage.

Operation · Assemble base of vise to body of vise with bolt; peen in two places to keep bolt tight.

New way · Four bodies are held in fixtures. Operator places four bases and bolts. He runs four bolts with air driver, then peens them with hammer.

Old way · Had only one fixture. Operator placed base and bolt, tightened bolt with T-wrench, peened in two places.

Savings · A 57% increase in production—from 112 per hour to 176. Air driver accounts for part of saving, the rest of the saving is in picking up and putting down the driver and hammer only once for four vises, instead of once for every vise.



Operation · Grind two sides and top of jaws of woodworker's vise.

New way · Operator places vise in fixture with first side towards wheel (as in picture). Feeds vise to wheel by long lever. Changes vise in fixture twice—to grind other side and top.

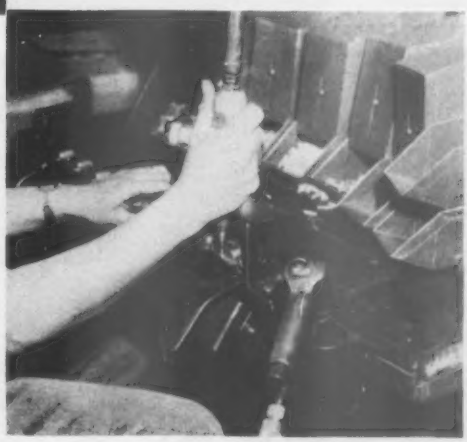
Old way · Operator picked up 21-lb. vise, held it manually against wheel. Finish grinding then required.

Savings · A 275% increase in production—from 23 to 65 per hour. Fatigue high in old method—virtually eliminated. Rigid fixture and greater pressure give smoother, flatter surface, eliminating need for finish grinding.

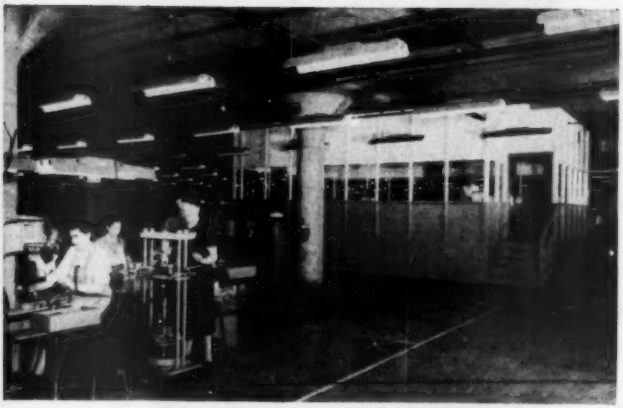
Operation · Mill assembled jaw castings to correct length and mill pad (anvil part of vise).
New way · Two milling machines located at right angles to each other—in position so that one operator can run both merely by turning his body. He loads and unloads one machine during operating cycle of the other (loading second machine with piece just unloaded from the first).
Old way · Machines were each tended by an operator, with a transport and storage between operations.
Savings · One operator released to other work, with no loss in production.

Operation · Ream, countersink, and burr a small, drilled pin.
New way · Operator places pin in air-operated collet, closes collet; reams (with tool at left in picture) and countersinks (as she's doing in picture). With foot switch, she starts motor to revolve part, then holds file against part to burr. Opens collet; part drops into finished parts box.
Old way · Reaming, countersinking done on standard drill presses; part held in different fixture for each operation. Burring done by hand.
Savings · A 70% increase in production—from 115 pieces per hour to 195.

Operation · Screw two small units together; stake (peen) the screw with air hammer.
New way · Nine sets of the parts are set in fixture, assembled with screws, using air driver. Fixture rolled over (using handles at each end of the fixture) and the nine screws are staked with air hammer.
Old way · Fixture did not have roll-over feature. After driving the screws, all nine units had to be moved to another fixture for staking.
Savings · A 63% increase in production—from 83 pieces per hour to 136.



OPERATING SHORTS

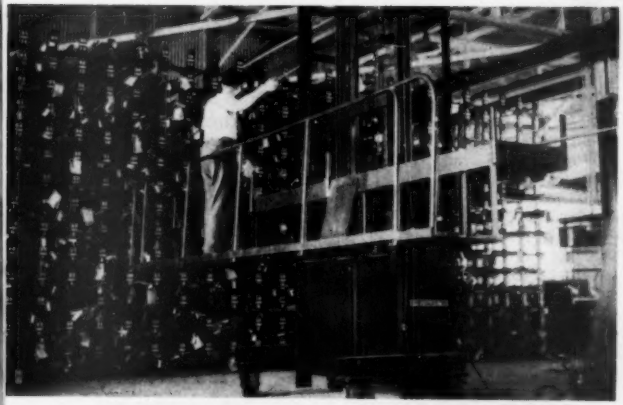


Raised Office Overlooks Shop Floor

While seated at their desks, supervisors can keep an eye on their departments at Zenith Radio Corporation, Chicago.

That's because supervisors' offices are centrally located and raised 30 inches above the shop floor. One office overlooks each floor. Each office has desks for the floor superintendent, his secretary, five departmental foremen, and two or three time study and methods men. Zenith says:

"The offices give the men their own bailiwick where they can hold conferences and union meetings. They've helped develop team spirit."

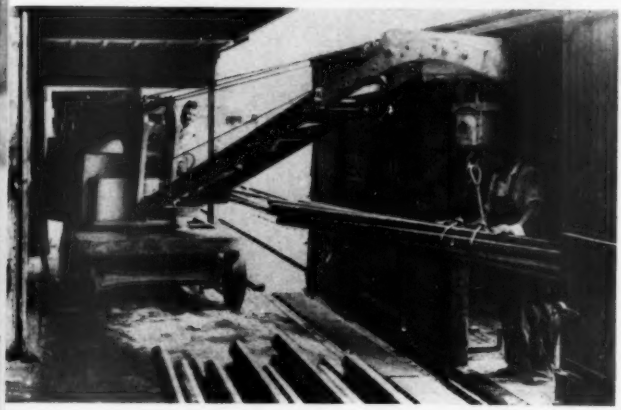


New Racks Store Wide Range of Tubing

Need a good method for "in-process" storage of tubing? Superior Tube Company uses twin racks at its Norristown, Pa., mill.

Problem: Provide easy-access, short-term storage in small quantities for tubing of different lengths, diameters, and alloys.

Superior's solution: Two facing structural steel storage racks and a mobile platform lift moving in the 20x25-ft. area between them. Each rack has 300 12-in.-square openings. Bundled and tagged material is lined up with the opening in which it's to be stored, then lifted to the right height. One man can do the job, except with heavier, longer tubes.



Crane Snakes Tubing From Box Cars

Puzzle: How to unload 20-ft. lengths of steel tube from box cars with 6-ft. door openings.

Solution by National Acme Company, Cleveland: Use a crane truck to snake bundled tubing through the doors at an angle.

One man runs the crane. Another hooks up bundles inside the car, then guides them to their proper spot on the shipping platform. Formerly four men toted tubes one at a time from the cars.

National Acme says the crane cuts manpower requirements by 60% and helps head off smashed-finger accidents.

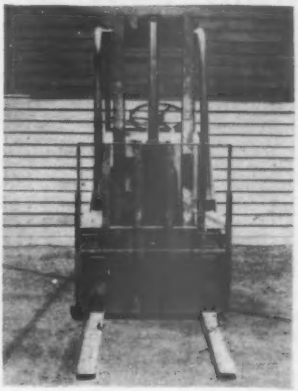
Suction System Collects Diamond Dust

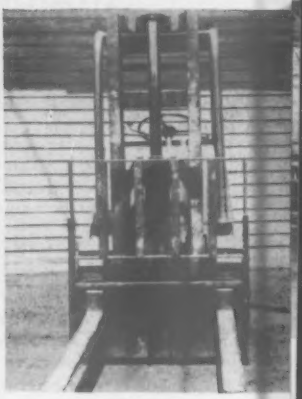
The dust in the pan—called "swarf"—contains tiny bits of diamond dust ("crushing bort"). It was rubbed from a diamond grinding wheel used to grind tungsten carbide tools. Chrysler Corporation uses dust collectors like the one shown (with front cover removed) to collect the swarf for recovery of the diamond dust.

The series of bags, open at the bottom, traps the dust as it is sucked into the collector, directs the dust into the pan. Before the operator removes the pan he steps on the pedal at the right to shake the bags.

An outside laboratory recovers the diamond dust from the swarf. Chrysler sells it to the manufacturers of its diamond wheels. The crushing bort costs about $5000 a pound.

Shorter Legs Mean Taller Reach





How to make a fork lift stack loads several inches higher was a problem at the American Cyanamid Company's Warners Plant, Linden, N. J. Towmotor Operator James F. Burns came up with the solution.

His truck would lift higher, Burns reasoned, if it started higher from the ground. So he shortened the fork's vertical prongs by 12 inches. Lifts are made from a platform at least 12 inches above floor level, since the redesigned forks can't be lowered to the floor.

American Cyanamid says the new prongs can be switched with the old ones in less than five minutes.

Dust Sucked From Holes in Tileboard

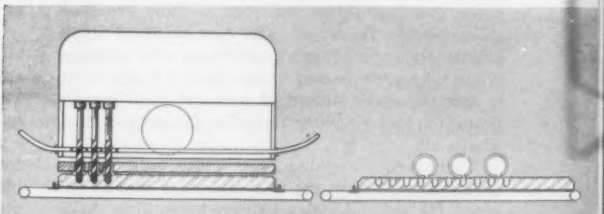


FIG. 1

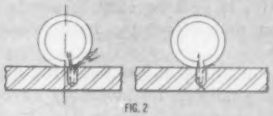
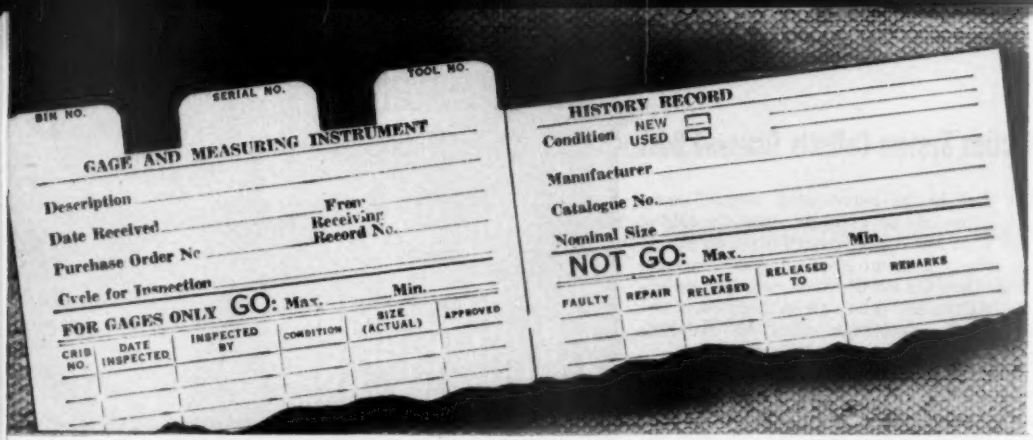


FIG. 2

Here's a way to remove dust from blind holes. It was perfected in Insulite Division, Minnesota & Ontario Paper Company, Minneapolis.

Old method: After 484 holes were drilled in each Acoustilite tile, a worker turned the tile over and knocked the dust loose.

New method (patent applied for): After being drilled, the tile moves along a conveyor under slotted pipes. A strong vacuum inside the pipes sucks dust from the holes into the pipes. The tile slides on the pipes, suction holding it against them. Figure 1 shows drilling equipment (left) and suction device. Figure 2 is a closeup of slotted vacuum pipes.



HISTORY CARD is made up when newly arrived tool or gage passes receiving inspection. Each later inspection is recorded, together with note of crib to which tool is released. Cards fold in center for easy storage in special clip files.

Fewest forms and files...yet

Maximum Tool-and-Gage Control

By **HARRY M. BALDWIN**, General Foreman, Quality Control, and **A. A. TUMSER**, Director, Quality Control
Bridgeport-Lycoming Division, AVCO Manufacturing Corporation, Stratford, Conn.

WE'VE GOT A SIMPLE BUT EFFECTIVE SYSTEM for controlling original issues, use, and re-inspection of some 8000 tools, gages, and measuring instruments. As we expand our production of war goods, the number will probably reach 17,000. No changes will be needed to handle this more-than-doubled load. We set two basic goals:

1. **Place control of tools, gages, and instruments in the same department as the responsibility for inspection of them.** In other words, centralize both control (record-keeping) and inspection in the tool-and-gage inspection department.

2. **Use a minimum of forms and files.** We have seven different forms, but four of them are used infrequently. There are also two types of small labels (about ½ x 1 inch), which we affix to items when they are released to the shop. An active file is maintained in individual tool-and-gage inspection cribs and a history record in the central files. That's all.

To see how the system works, let's follow a micrometer, say, from the time it arrives new at the plant. (Gages and tools—fixtures for milling, drilling, boring, profiling, etc.—are treated somewhat differently. It will be easy to see how and why after you understand the basic workings of the system.)

When the mike is received, and after it clears the master tool crib for inventory purposes, a tool-and-gage inspector inspects it to be sure it conforms to the specifications and to the data on the receiving record. If it does, the information from this record is transferred to a history card in our central files. In addition to initialing approval on the first line of the card, note is made of the number of the tool crib to which the mike is sent.

"Original release" to the shop

When someone needs this particular style and size mike, he fills out a "measuring instrument and gage (MI&G) order." Carbon backs on the form make it possible to produce five copies with a single writing. The man delivers all five copies to the tool crib in his area.

The tool crib attendant now sends the mike and all five copies of the form to the inspector in the adjacent tool-and-gage inspection (T&GI) crib. There is no delay here, as the item has been inspected prior to storage in the tool crib.

At this point, the T&G inspector applies a "date for reinspection" label to a visible, non-working surface of the mike. He arrives at the date by adding the "cycling period" to the date on which the mike is being issued. The date is stamped on the label with a special opaque ink which is resistant to oils and most acids. As an added protection, he sprays a special plastic compound over the applied label. Total time for these operations is about two minutes.

When the T&G inspector issues the mike to the

CENTRAL FILES provide dustproof but easily accessible storage for history cards. This bank of files contains a complete record of inspections and performance of over 8000 tools, gages, and measuring instruments in use at Bridgeport-Lycoming.

ORDER FORM in quintuplicate provides complete in-the-shop control for both tool crib and tool-and-gage inspection.

CONTROL BOARD holds copies of tool orders filed by date for re-inspection. Follow-up is fast if tool is not back by then.

shop man, he also gives him back one copy of his MI&G order. One copy of the order goes back to the tool crib, to be filed under the employee's clock number. One copy goes to central files.

The two remaining copies are filed in the T&GI crib under "date due for reinspection."

Obviously, the communications problem between the tool crib and the T&GI crib could get out of hand if the two were widely separated. Here at Bridgeport-Lycoming, there is a T&GI crib immediately adjacent to each sub-tool crib.

Continued use in the shop

Once released from the T&GI crib, as described above, the mike can move in and out of the tool crib on a regular tool order, which has nothing to do with our control procedure. The same is true of any other measuring instrument.

But if it becomes damaged, or when it reaches the "date for reinspection," it must be returned to the T&GI crib. Then the T&G inspector takes his two copies of the MI&G order from his file. He stamps one "returned," and gives it to the employee as a receipt. The other goes to the tool crib as a "kill" notice on the copy filed under the employee's clock number and is then forwarded to the central files for entry on the history card.

Actually, the mike we've been discussing is one of a group of instruments (visual gages, electro-limits, super-micrometers, surface plates, etc.) that are not ordinarily turned in at the end of each shift. To eliminate the loss of shop time (and paperwork) involved in turning them in, our floor T&G inspectors will inspect them at their location. He applies a new "date for reinspection" label after each inspection. But if the inspector, for any reason, fails to get around to inspect the instrument, it is the

employee's responsibility to get it back to the T&GI crib. Unless the inspector is tied up on an emergency job, a request for inspection from an employee will get prompt action, so that the employee will not have to take the instrument back to the crib and withdraw another one.

How the follow-up works

Two copies of the MI&G order in the visible clips of the T&GI crib file (shown on page 111) are our insurance policy against items being overdue for re-inspection. Since these copies are removed when an item comes back to the crib at the end of the cycle, any that remain in clips dated earlier than the current date are automatically overdue.

When an item is overdue, the T&GI foreman makes out a "delinquent report" and sends it to the supervisor of the employee to whom the item is charged. It is then mandatory that the item be returned immediately to tool-and-gage inspection. These reports, through close co-operation and constant follow-up, are kept to a minimum.

What about the mike that is inspected on the floor? If it is approved, the inspector applies a new "date for re-inspection label." If it is faulty in any respect, the employee is directed to return it to the T&GI crib at once. In either case, the inspector fills out a "tool, gage, and measuring instrument report." One copy goes to the central file, to be recorded on the history card. A second copy goes to the T&GI crib. If the item is all right, the crib attendant refiles the new MI&G order under the new due date.

Thread or plug gages

Unlike measuring instruments, thread and plug gages cannot be reissued without inspection. They must be reinspected each time they are returned —even though the "date for re-inspection" is weeks or months ahead. This is necessary to determine gage life in various departments and to keep track of wear on gages.

When a new gage is inspected, a gage tag is wired to the gage, and a piece of green tape applied where the "date for reinspection" will later be affixed. The top of the 2-part gage tag is sent to the central files, where the information from it is entered on the history card.

After inspection, the nib of the gage is coated with plastic material in such manner as to prevent its use without breaking the coating. Then it is sent to the tool crib for storage until called for. The gage may not be issued if the plastic coating of the nib is ruptured unless it is inspected again.

When an employee calls for the gage, the procedure is the same as with measuring instruments, except that the T&G inspector removes the gage tag and green tape before applying the "date for re-inspection label." Gages are always returned directly to the T&G crib and then forwarded to the adjacent tool crib. Again when the gage is recycled, one of the two copies of the MI&G order goes along with the gage back to the tool crib as a "kill" notice on the charge against the employee's clock number.

Procedure for tools

When we talk about tools in connection with this control program, we mean fixtures for milling, drilling, etc.

The first piece produced, after a tool is released to manufacturing, goes to the T&G inspector. On the basis of this first-piece inspection, he fills out a "tool, gage, and measuring instrument report" for the tool and a quality recheck report for the part. Copies of these reports are sent to the chief of manufacturing inspection, tool engineering, and manufacturing, as well as to the central files.

If the tool is accepted, the T&G inspector attaches a "date inspected" label or tag. This label is similar in all respects to the "date for re-inspection" label. We use this "inspected" rather than "re-inspection" because the regular quality recheck procedure automatically covers all fixtures which produce the product.

However, the first piece may conform to detail part prints, yet not be held to operational limits as required by process sheets. In such a case, the part is likely to run out of control (as defined by quality control limits on process sheets) on production runs. In this event, the inspector puts a "conditional release" tag on the tool. The inspector's report specifies what dimensions are affected. Meanwhile, the tool can be used. But the tag is a warning that it must be used — and watched — carefully.

If the first piece is not acceptable, the inspector puts a "faulty tool" tag on the tool. No one is permitted to use a tool tagged that way.

TO SUM UP • It was only about a year ago that we set up shop here at Bridgeport-Lycoming. So we don't have a long experience with this system to report. But it's usually the early stages of a program that show up the bugs and weak spots.

Here is what we have found so far:

- We are getting effective centralized control. No gages or measuring instruments out of tolerance are being used.
- The initial outlay was low—less than $2700 for the visible-clip wall boards and cabinets necessary to set up and maintain the system, even when we reach approximately 17,000 items.
- Paperwork is minimum, so unit cost of control is low. It costs us about $8 a day for forms. We are now cycling approximately 300 items daily, including thread and plug gages.
- We're fast getting enough information on our history cards and through our gage tags to have a valuable guide for future planning.

At last, a way to find out...

Who's at Fault—the Man or the Air Tool?

By ROBERT GALLOWAY, Senior Staff Engineer, Wallace Clark & Company, Inc., New York

It's a question that stumps many a production chief, industrial engineer, plant engineer. Here's the answer — and the solution to your pneumatic tool problems. The technique was developed by the author in a plant where he was plant engineer and later plant superintendent.

PETE WAS A DARN GOOD toolroom supervisor. None better. He'd been at it for years. He knew the insides of tools, and he worked from his records. The tools in his toolrooms were well racked, under control, and lubricated according to the makers' instructions.

Every few days Pete had his ornery side. Today was one of them. When I caught up with him he was battling it out with two mechanics who were griping about a couple of air drills.

These two guys told Pete the drills were ready for the scrap heap. Pete argued there was nothing wrong with them. Could be, he brazenly suggested, the men weren't using them right. Well, the argument ended nowhere. Two disgusted mechanics stalked off with the air tools. And one toolroom supervisor felt pretty low about the job and life in general.

When the storm had subsided, we talked it over —Pete and I. Pete's first idea was:

"Some guys look for all sorts of excuses not to work."

But then he did admit he didn't know who was right. There was no way of really testing an air drill under standard load conditions to see if it was faulty. If a tool was returned with a complaint, the repairman examined it, opened it up, and replaced any worn parts. But when he put it together again he had no way of knowing whether the tool was up to the manufacturer's original standard. Sure, it would run, but that was no proof of its good performance.

Then, too, the cause of trouble might be elsewhere—low air pressure, or too long an air "whip" from the air supply to the tool. Or it might be a defective air valve in the main line, or low temperature freezing up outdoor lines.

With these admissions we were getting somewhere. Together we tried to localize the problem, and came up with two points of attack. Something could be wrong with (1) the tool, or (2) field conditions. If we could eliminate these factors as possible causes, we'd know the user was at fault.

We needed tool performance standards and testing facilities to check our tools. Also we needed equipment to check field conditions to assure proper application. So everybody pitched in his ideas. We put them together, and here's how they solved our pneumatic tool problem.

Tests for Tools

We found that no single piece of equipment could be designed to test all our air tools. Our plant used air tools of various makes, types, and sizes—from small screwdrivers to heavy-duty impact wrenches. But they could all be grouped into one of three major types: (1) rotary, (2) impact, and (3) hammers. We had to devise separate test equipment and tests for each type.

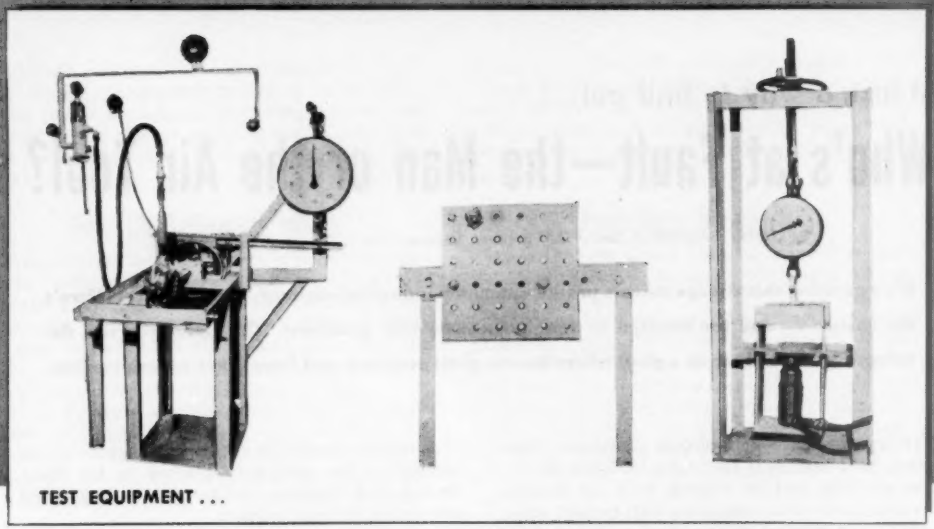
Air flow meter. Common to all tests was a compressed-air supply line with an air flow meter. The meter was needed to measure directly in cubic feet per minute (cfm.) the air consumption of the tool.

Air pressure gage. In this same supply line we also put an air-pressure gage to show pounds per square inch (psi.) of air pressure. Since all makers design their own tools for operation at 90 psi., we used this pressure as our test standard.

Test standards. Tests are only good when you can compare the results with a standard. Here we ran into a stonewall. No maker includes in his catalogs complete information on performance of his tools. You do find revolutions per minute (rpm.). But data on horsepower, for example, just aren't available. No use asking.

So for the most part we had to develop standards of performance ourselves, by making tests on new tools and used tools in our cribs. These standards were entered on cards for the various types of tools. They became the "bible" of the tool repair shop. We'll show you on the following pages how to develop reliable air tool performance standards for your own use.

For detailed descriptions of tests devised for rotary-, impact-, and hammer-type tools, turn the page.



TEST EQUIPMENT . . .

for rotary-type . . . impact-type . . . and hammer-type tools.

TESTS FOR AIR TOOLS . . . *Begins on page 113*

Rotary-Type Tools

These tools include drills, reamers, grinders, sanders, and wire-brush machines.

Test needed. We felt we could get a true test from knowing the revolutions per minute (rpm.) without load, and the horsepower (hp.) under load.

Test equipment. We got rpm. from a tachometer. Horsepower is computed from rpm. and torque. A common Prony brake, as described in most engineering handbooks, is an easy method of finding the torque, and therefore horsepower, of any rotating unit.

Our rotary test equipment is shown above. The torque reading is the product of the dial reading of the spring scale (by observation) in pounds, and the length of the brake arm (a constant) in feet. We made our Prony brake from spare and purchased parts. The stand was made adjustable and fitted with adaptors to hold various sized tools.

Test procedure. It was simple. We set the air tool in the Prony brake, and connected it to the air supply through the flexible hose. Pressure was then released from the Prony brake wheel, by loosening a wing nut, and the tool started. The scale was already adjusted to read zero, to compensate for dead weight of lever arm.

First we checked rpm. at no load, or free speed. If the speed differed from the maker's recommendations, we adjusted the governor on the tool to suit. This step is important for grinders, where excessive speeds might cause a wheel to shatter and hurt the worker.

Load was imposed on the tool merely by tightening the wing nut of the brake. We took simultaneous readings of the spring scale, the tachometer, and the air-flow meter.

Test results. To simplify the computation of horsepower, we developed a quick-reading table which we called our "Power Index" table (opposite page). We found it better to talk in terms of power index, which we set at 100 times the horsepower, because horsepower is generally a low figure running into two-place decimals. For any given scale reading and simultaneous tachometer reading we can pick off the actual power index. Knowing the standard power index for any given tool from our "bible," we could tell how well the tested tool was performing.

Basis of the table is the well-known engineering formula for any Prony brake:

$$\text{Horsepower} = 1.903\ LxSxFx10^{-4}$$

where L—Length of arm in feet, S—rpm., F—scale reading in pounds.

Impact-Type Tools

These tools include wrenches, screwdrivers, and nut runners.

Test needed. Although the size of the tool might vary considerably, all tools in this group create an impact-tightening action which can be measured by the torque needed to release the nut or screw.

Test equipment. The special characteristics of any given job—material, point of resistance, etc. —affect the maximum torque a tool can impart to the nut or screw. For this reason Pete suggested our test simulate actual job conditions. Otherwise, we found, results will fluctuate widely.

RPM.	SCALE READINGS													
	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#
250	48	57	67	76	86	95	104	114	124	133	143	152	161	170
260	49	59	70	78	89	99	108	118	128	138	149	158	168	178
270	52	62	72	82	93	102	112	123	133	144	154	164	172	184
280	54	64	75	85	96	106	117	128	138	148	160	170	180	191
290	55	66	78	88	99	110	121	132	143	154	165	176	187	198
300	57	68	80	91	103	114	125	137	148	160	172	182	194	205
310	59	71	83	95	106	118	129	141	153	164	178	188	200	212
320	61	73	85	97	110	121	133	145	158	170	183	194	206	218
330	63	75	88	100	113	125	137	150	163	175	188	200	212	225
340	65	78	91	102	115	129	141	155	168	180	195	206	220	232
350	67	80	93	107	120	133	147	160	173	186	200	213	225	240
360	69	82	96	110	123	136	150	164	178	190	206	218	233	246
370	71	85	99	113	127	140	154	168	183	195	211	224	238	251
380	73	87	101	116	130	144	158	173	188	202	218	230	245	260
390	75	89	105	119	134	148	162	178	193	208	224	236	252	267
400	77	92	108	122	138	152	166	182	198	213	228	243	258	273
410	78	93	110	125	142	156	171	187	205	218	235	250	265	280
420	80	96	113	128	144	160	175	191	208	222	240	255	270	288
430	82	98	116	132	148	163	179	195	213	228	245	260	277	294
440	84	100	118	134	151	167	183	200	218	233	250	268	283	300
450	86	101	120	138	154	170	187	205	223	240	260	274	290	318

POWER INDEX TABLE interprets Prony brake test results into air-tool power.

AIR PRESSURE PSI.	REJECT			OK FOR USE	REQUIRED RANGE AFTER REPAIR		
	EFFICIENCY %						
	50	60	70	80	90	100	110
	SCALE READINGS						
90	314	376	439	502	564	627	690 –
	289	347	405	462	520	578	636 –
95	331	398	464	530	596	662	729 –
	306	367	428	489	550	611	672 –
100	349	418	488	558	627	697	767 –
	321	326	450	515	578	643	707 –

AIR-JAM efficiency table.

One of the test devices (typical of all the others) is shown on the opposite page. It is a simple unit composed of two metal plates mounted back-to-back on a frame. The plates have matching holes for bolts, onto which the test tools were to run the nuts. This test was for one of our larger impact wrenches. For smaller wrenches we used the same kind of set-up, only smaller. To measure the test torque, we used a standard torque wrench that has a reading dial. You can purchase such a wrench from several makers.

Test procedure. Took a minute. We inserted a test bolt, ran a nut onto it as far as the tool would go. Then we loosened the nut with the torque wrench, while taking our dial reading.

Test results. A direct comparison of the test reading with the pre-determined "bible" standards was an absolute measure of the effectiveness of the tool tested. The air consumption of the test tool, as shown on the air-flow meter, showed if there was any wear in the key parts.

Hammer-Type Tools

These tools include chippers, scalers, riveters, air jams, and compression riveters.

Test needed. We devised tests for tools of competitive makers from whom we intended to buy. These tests, however, required rather lengthy procedures that weren't suited to the quick results needed in the shop.

For shop testing we found our best criteria to be: (1) air consumption, and (2) impact noise. The air-flow meter showed up those "air hogs" that were using big volumes of air under high throttle and therefore giving poor results. The ear of our repairman could always tell a good-acting hammer by the sound it made when bucking the toolholder against a heavy oak block. These techniques may seem unscientific, but they proved reliable in our testing of hammer-type tools.

Test equipment. We were able to devise a simple test for an air jam. This is the tool used to back up rivets in cramped quarters. Practically the only cause of poor action is leakage around the leather gasket. Often weak-acting air jams were blamed for riveting rejects.

We fabricated a test stand from angle iron, as shown on the opposite page. The spring scale is of standard make. The handwheel and threaded stem at the top were used to regulate the travel of the lower movable cage to suit the size of the air jam. The force of compression of the tool against the fixed plate pushed the cage down and registered directly on the spring scale.

Test procedure. Again, very simple. The air tool was fitted in the lower cage the same way you would use it on the job. The air pressure was turned on, and we read the scale.

Test results. The scale readings were compared with a table of standards for various makes of air jams (see table above, right). It was prepared by multiplying the piston area by the air pressure. (Piston area was computed from the diameter given in the maker's catalog.) The result gave the theoretical force, in pounds, which should be exerted by the tool if it was in good condition.

We rated this value as 110% efficient. Then we calculated the theoretical readings for lower efficiencies, in decrements of 10%, down to 50%. Anything testing below 80% was considered unsatisfactory.

Turn the page

TESTS FOR AIR TOOLS . . .

Begins on page 113

How to Make Reliable Field Checks

A tool that tested OK in the toolroom didn't promise satisfactory performance on the job. So we laid out a routine of field checks whenever a worker complained his tool was acting up although it checked OK.

System air pressure. Our compressed air came from a central powerhouse. Each compressor was cut in manually, as required. Sometimes the engineer didn't get around to it fast enough. So we installed a pressure gage in the main line, and a low-point alarm set to go off at 90 psi. Also, we installed a recording gage with 24-hour charts.

Local air pressure. A minimum system pressure of 90 pounds didn't guarantee as high a pressure at the air tool for several reasons, as we found out later—such as undersized branch lines, use of long or undersized air hose, or dirt or some other obstruction in the air hose.

Whenever a tool that was turned in as "no good" tested OK, Pete or his assistant would hustle down to the workplace. He tested the air pressure at the tool with a hypodermic needle gage that doesn't leave a hole in the hose when you remove it. In most cases tool trouble was caused by low pressure, for the reasons just stated.

Sometimes the worker was just looking for an excuse to wander from the job. A few men didn't know how to operate the tool. Or in freezing weather the condensation was freezing in the supply line because the alcohol injector wasn't properly adjusted.

This double-barreled attack—testing air tools and checking field conditions—really paid off. The workers were impressed by the testing procedures and were sold on their reliability. We put all new tools to test. We now had facts to guide our buying, not just claims or reputations. We standardized our models on the basis of these tests. Now, for the first time, we knew that a repaired tool measured up to standard performance.

I certainly couldn't keep from grinning when I saw Pete hotfooting it out of the toolroom door with his needle gage. Nobody was going to pin his ears back anymore with the remark, "That tool stinks!" No sir, not when his tests proved it was OK.

"Out of every dollar we kept a hair over 4 cents."

"The Company Makes Too Much Money"

By RAY W. SHERMAN

THE "FOREMEN ONLY" MEETING ENDED, and the brass came in—Plant Manager Tobias Quint, the supers, the staff, even the Old Man.

"Now—" Toby fussed with papers on the lectern "—the *Center City Gazette* had a story that Central Manufacturing made $430,000. How many of you fellers saw it?"

All the hands went up.

"Red—" Toby stepped before Red Kane, veteran from Central's early days,"—have you heard anybody say the company made too much money?"

"Have I?" Red snorted.

"Huh!" Old Tom Callahan rumbled, "plenty of 'em, Toby."

"Tell me, Red—" Toby grinned "—what did you tell 'em?"

"Well," said Red, "I had a big idea. It's a matter of naughts. So I wrote down the national debt—"

"How many naughts?" someone asked.

"Millions and millions of 'em!" Red waved an arm. "And I told the lad to look at the naughts and look at the 430-grand. It worked all right till under the 430-grand he wrote down his take-home. That looked kind of sickly without any naughts, so—"

"OK!" Toby faced the crowd. "Out of each dollar the company takes in, how many cents do *you* think the men think we keep for profit?"

Nobody answered. Toby asked for hands.

"How many think we keep 50 cents?" A few went up. Most went up at 30. A few at 20. At 5 cents some laughed. Toby started for the blackboard, but stopped and went to the window.

"Jimmy!" He beckoned to a newsboy on a bicycle. "Come here a minute."

With the boy beside him, Toby said: "Jimmy is a business. Owner, workers, all in one man. He sells us *Gazettes* at a nickel apiece. On each one, Jimmy, you make how much?"

Puzzled, Jimmy answered: "Cent and a half."

"And what are your expenses?"

"Well—" Jimmy grinned "—I have a sundae every day at Keenan's." His face fell at the laugh.

"They never peddled papers, Jimmy." Toby smiled. "Here's two-bits for today's expenses. Thanks for coming in."

At the blackboard Toby figured: "Gross sales, 5 cents. Net profit, 1½ cents. Out of every dollar Jimmy takes in, he keeps 30 cents."

Dusting his hands, Toby turned back to the men.

"How much should this company keep? What do you think is fair?"

Back in the room a voice said: "Does seem it ought to do as well as a newsboy."

"OK." Toby was at the board again, dividing sales of $10,487,241.10 into net profit of $429,876.88. It came out 0.041. "Out of every dollar we kept a hair over 4 cents. And men—it's too thin. A strong wind could blow it all away."

The hush in the auditorium was broken by Old Tom Callahan's rumble:

"You mean you sell $6 worth of stuff and haven't made enough to pay the newsboy for a week?"

"That's right," said Toby.

"Why didn't the *Gazette* print that?"

Toby shrugged. "We can't tell a newspaper what to print. They never print cents of profit."

"But, Toby!" Red Kane's hand shot up. "Our magazine—*Central Hello*—why don't we print it there? The men all read it."

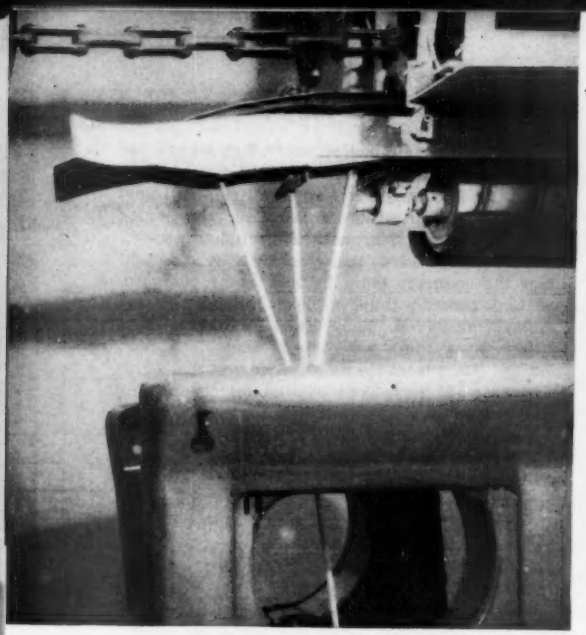
Toby removed his glasses. Looked down at Red a moment. Turned to the Old Man.

"Hod," he said. "We work hard to sell our goods. But—selling our story to our own people—I'm afraid we've loused it up."

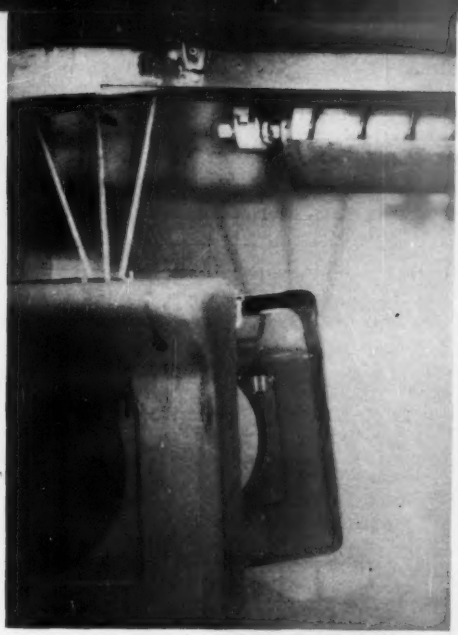
"Maybe—" the old man smiled "—we should make Red an editor of *Central Hello*."

"Swell!" boomed a voice. "Just give him a pail of commas and a bucket of naughts."

To which Red, over his shoulder, thumbed his nose and commented: "Naughts to you!"



1 UNPAINTED PARTS ARRIVE at paint booth on holders that hang from hooks on chain conveyor. They're 22 inches apart and traveling at a speed of 18.5 feet per minute. They have to be widely spaced so they can go around corners on the chain conveyor without bumping. At head of paint booth, weight of holder is taken off hook. Pieces are supported by flat plate on shank of holder. Both edges of plate rest on track that runs length of spray booth. Although weight is now on plate, hook continues to pull parts until they reach a worm gear.



2 THE WORM GEAR is the mechanism that does the bunching. Horizontal bar, located below plate, engages with worm gear. Pitch of worm decreases from left to right—into spray booth. Here's why: the greater the pitch, the faster the part is moved. So when part first hits worm it speeds up—moves faster than it did on main conveyor line. This pulls part away from hook. Then part slows down gradually to 12.4 feet per minute—its speed of travel through paint booth. On ride through booth, parts are driven by constant-pitch worm.

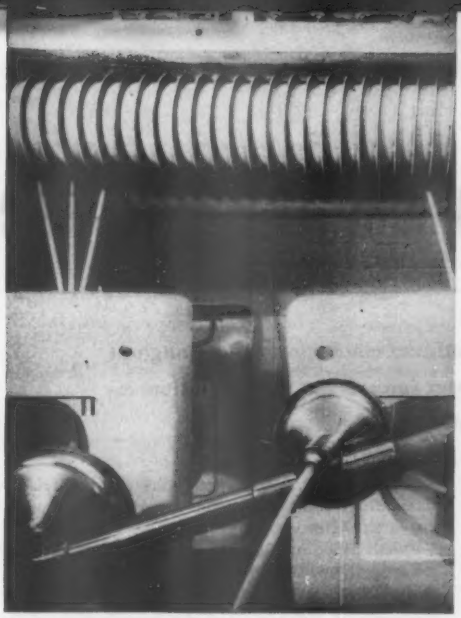
New "Bunching" Conveyor

By HOWARD MARKS
General Superintendent, St. Joseph Plants
Whirlpool Corporation, St. Joseph, Mich.

You're looking at the first production use of the newest thing in conveyors—the bunching conveyor. Our engineers design-modified the unit as required to fit our existing equipment, and our plant maintenance department built it. It polished off a spacing problem we faced in . . .

OUR AUTOMATIC PAINTING LINE · We recently installed a new electrostatic paint system—a Ransburg No. 2 (FACTORY, Sept. 1951, p. 250). The benefits have been many. We get a better and more uniform covering. The number of repaint jobs has been cut from 40% to less than 10%—and less than 1% of these are due to defective application. Better than 99% of the paint leaving the guns is deposited on the work. We used to cover 8 cabinets with each gallon of paint. Now we're getting 22 cabinets painted with that same gallon. We used to have 8 men per shift spraying paint in this booth. Now, depending on the part being sprayed, we have either 1 man or 3 men reenforcing—pre-spraying with a light coat certain spots on the cabinets where the coat deposited by the automatic equipment is a little thin.

Maintenance costs are way down, too—continuous cleaning of paint booths and spray guns is not necessary. The tile walls and asphalt tile floor of our paint booths are almost kitchen-clean. The cone-shaped spray heads of the new system require only an occasional wipe. Further, we've eliminated the considerable cost of the air make-up used to ventilate our old booth. There is no problem of rapid air change to remove overspray, and solvent vapor is adequately removed by a simple ventilating system.



3 PARTS TRAVEL THROUGH BOOTH with their edges 5 inches apart. You may be able to visualize bunching action better if you compare it to a traffic jam. Volume of parts passing any point on the main conveyor, at 18.5 feet per minute, or on conveyor in paint booth, at 12.4 feet per minute, is, of course, always the same. If same volume of parts is to pass a point at a slower speed, they've got to be closer together. Actually, Whirlpool's approach is just the reverse. It wanted the parts to be closer together, so slows them down.

4 AS PARTS LEAVE PAINT BOOTH, worm gear increases travel speed from 12.4-fpm. pace through booth to 18.5-fpm. pace of main conveyor. Acceleration is gradual, so that just before part reaches main-line speed, a main conveyor hook comes up from behind, re-engages loop at top of assembly. As a result, four men—two who used to transfer parts from main conveyor to spray booth conveyor, and two who transferred them back again after the trip through the booth—are no longer needed. And an "automatic" process becomes really automatic.

Improves Automatic Painting

THIS WAS OUR PROBLEM • With any automatic system where paint is sprayed or atomized continuously, it's desirable to get the pieces to be painted as close together as possible. With an electrostatic system, if the pieces are not close, paint particles "go out to meet" the next piece coming down the line, "follow after" the last piece to pass. This means an undesirable build-up of paint on the edges of the piece. With a simple air-spray system, the trouble is you waste all the paint that gets sprayed into the air space between pieces.

And while it's desirable to have the pieces close together in the spray booth, you want them farther apart as they move through the drying booth and through the shop—so they can turn corners and swing from their hooks without banging against each other and damaging the finish.

As our main conveyor is set up, the edges of the washer cabinets are 22 inches apart—too far for the most effective painting. So we installed a separate conveyor, with hooks so placed that the edges would be the desired 5 inches apart. Two men removed the pieces from the main conveyor, placed them on the painting conveyor. And, two more men replaced the newly painted pieces on the main conveyor for their trip through the drying oven and out into the shop.

This worked, of course, but was far from the automatic system we wanted. Ransburg provided the answer to this problem also with its . . .

BUNCHING CONVEYOR • The photographs show how it works — how it does the spacing job that 4 men used to do. And how it eliminates the possibility of newly painted pieces being marred. This happened too often with the old method, when we had the men putting them back on the main conveyor.

What you need to know about

Connectors for Aluminum Wire and Cable

By JOE ST. ANDRE • Electrical Editor, FACTORY

If and when you begin to use aluminum conductors, your toughest problem will be connectors. But you can solve it without "pioneering" by getting your electricians started right.

ALUMINUM WIRE AND CABLE will soon be challenging copper both in price and availability—I have no doubt about that. But before you make up your mind which type of wire will go into your plant, you should consider carefully the problems of connecting the wires.

In most plants, you'll be connecting aluminum wire to existing distribution systems or equipment using copper wire. Panelboards already installed will have copper bus bars to which the aluminum wire will have to be connected. Motors, transformers, switchgear, etc., will most likely have copper terminals. Your men installing the new wire will not be as familiar with handling it as "outside" construction electricians have become. But they can learn. Connector manufacturers list six problems:

Problem 1 · OXIDE FILM

As soon as aluminum is exposed to air, a film of aluminum oxide forms over it. This film helps give aluminum wire its excellent anti-corrosion property. Unfortunately, this oxide is a non-conductor and forms a high resistance to the flow of electric current. It insulates the strands in an aluminum cable from one another. It tends to insulate the cable from the connector on the end of it. It is present on aluminum bus bars, from which it must be removed or broken down when you make any connections.

On a single solid aluminum wire, it is not difficult to clean off the oxide. With a stranded conductor, the problem is more complicated. Each strand is covered with its own film of aluminum oxide. Each strand is thus insulated from the other, like the wires in a telephone cable. But if the conductor is to carry its full load of current, all the strands must be brought into good electrical contact with each other and with the connector.

The oxide film can be removed just as insulating enamel can—by scraping, by chemical dipping, or by fine abrasives. (But on aluminum cable, this cleaning is only temporary. The oxide film forms again as soon as the cable is exposed to the air.) Chemical cleaning treatment may cause corrosion unless flux, acid, or caustics used are thoroughly rinsed out after cleaning.

I visited two manufacturers of connectors to find out how they solved the oxide-film problem.

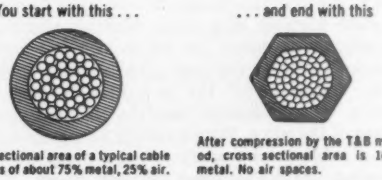
Martin D. Bergan, director of research and development of the Thomas & Betts Company, Elizabeth, N. J., said T&B connectors are designed for use without any special preparation of normally clean cable. But the company recommends the following procedure:

1. Coat the cable end with a generous layer of oxide inhibitor or zinc chromate paste. Petroleum jelly or light machine grease may also be used.

2. Remove the oxide film with fine emery cloth or a wire brush, working right through the compounds mentioned above. The compound seals the freshly cleaned aluminum against air and keeps a new oxide film from forming.

Put the cable end (compound and all) immediately into the connector. Be careful to wipe any surplus compound off the cable insulation, as the compound may damage it.

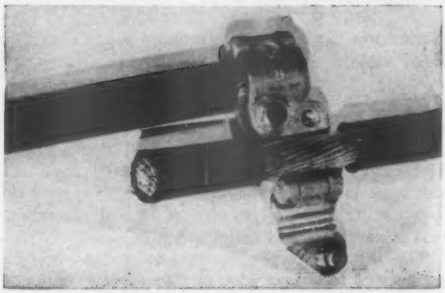
If the connector is of the compression type, the barrel of the connector will be compressed on the cable until the cable strands and the connector are one almost solid unit. These diagrams show what happens:



Cross sectional area of a typical cable consists of about 75% metal, 25% air.

After compression by the T&B method, cross sectional area is 100% metal. No air spaces.

The oxide film is rubbed off the aluminum strands by the tremendous pressure of the compression. Because all the air is squeezed out of the joint, the insulating oxide film never has a chance to form again. The result is a clean connection between the aluminum in the cable and the aluminum in the connector.



A BOLTED CONNECTOR like this is designed for aluminum cable. It has fine grooves that bite through the oxide film and make clean contacts with the aluminum of the cable.

When aluminum lugs are to be bolted to aluminum bus, or to other aluminum connectors, it is good practice to clean both contact surfaces with a wire brush through a petrolatum-base compound, and to leave the compound in place when the surfaces are bolted together.

Be sure to select the right size bolted connector for the cable with which it is to be used. The barrel of the connector is an accurate fit for the particular size cable. It has fine grooves inside the barrel which bite through the oxide film and make clean contacts with the aluminum of the cable (picture above). Bolts and nutcracker action of connector insure uniform pressure for good, permanent contact.

Julian Rogoff, chief engineer of Burndy Engineering Company, Norwalk, Conn., told me Burndy uses a compound of zinc granules of carefully controlled particle size suspended in a viscous carrier to break down the oxide on the individual strands of wire. This compound performs three functions:

1. It provides a great number of current-carrying "bridges" that fill in all the areas where the oxide film on the contact surfaces has been broken. The zinc particles have a high conductivity of current; they also mechanically break down the oxide on the individual strands at the time pressure is applied to the connectors either by compression or bolting. This gives clean metal-to-metal contacts.

2. The compound, forced around and between the strands of multi-strand cable at a connection, helps distribute current evenly throughout all the strands. This prevents the local heating of individual strands—which occurs if some strands carry more current than they are supposed to.

3. The compound seals the electrical joint against oxidation and corrosion. No air or moisture can reach contact surfaces that are well covered by this compound. The compound is exceedingly tenacious, and its protective action is effective for many years of service.

Use of a compound to break down the oxide on aluminum cable will be a new job for your electricians. Be sure they learn how to do it right.

When using bolted-type connectors, they'll have to smear the compound on the surface of the outer strands and work it into the inner strands with a wire brush.

On compression-type fittings, Burndy has filled the barrels of the connectors with the compound. When you insert the cable, the compound is forced in between the strands.

Problem 2 · COLD FLOW

Cold flow is a gradual migration of metal away from places where there is high pressure on the metal to places where the pressure is low. Creep happens when the metal is put under pressure, as in a bolted connector or compression fitting.

This creepage can be compared to what happens if you lay a plate on top of a pound of butter. The block of butter will be flattened out by the plate. The heavier the plate, the sooner you will flatten out the block. Heat will hasten the action, too.

The same thing happens—less dramatically—to metal. All metals have a creepage rate.

What's important is that aluminum has a high rate of creepage compared with copper. Under pressure of 18,000 pounds per square inch at usual room temperature, the creep rate for aluminum is 100 times that of copper. Raise the temperature to 70C. (158F.)—and aluminum now has a creepage rate 10,000 times that of copper.

What does that mean to aluminum cable in connectors? The result of creepage in a connector is that in time the cable will become loose in the barrel of the connector. This will mean a poor connection and will cause heating. As with the butter, the heat will promote still greater creepage, making a poorer connection and still more heat—until the connector begins to arc, and then it will fail in a short time.

So connectors designed for use with aluminum must have larger surfaces so as to reduce the total pressure on the cable from the connector to low values. This reduces the creepage action.

Problem 3 · THERMAL EXPANSION

So far we have been talking mostly about putting connectors on aluminum cable. But these connectors have to be connected to bus bars, terminals, or other connectors. Most of these devices are made of copper. How to make copper and aluminum behave when they are in contact with one another is another problem.

Aluminum cable expands as the cable gets warm from the current flowing through it. Copper cable does the same thing. The trouble is that they do not expand at the same rate.

Aluminum cable will expand—or shrink—38% faster than copper cable at the same rate of temperature change.

When aluminum lugs are bolted to copper bus bars, the connection is not seriously affected by

thermal expansion and contraction. The large surfaces firmly bolted under large washers take care of the difference in the changes in size.

The problem is different when the contact between copper and aluminum occurs in the connector. A copper terminal that is not designed for aluminum, when tightened on an aluminum cable at room temperature, will be loose when the temperature drops to freezing—because the aluminum cable shrinks more than the copper terminal.

Such a copper terminal, on the other hand, will become tighter as the cable becomes warm from carrying current—because the aluminum expands faster than the copper. If the temperature rises much above the temperature at which the connector was first installed, the aluminum will be over-compressed. Aluminum is softer than copper, so it has to move somewhere. It will extrude away from the connector, due to the pressure such as I described under cold flow.

Then you turn the current off. The cable shrinks as it cools off, but the metal, of course, doesn't flow back into the connector. So you now have a loose connection on your hands. Loose connections mean high-resistant contacts, which generate greater heat. This cycle of heating and cooling repeated over and over again will lead to so loose a connection that arcing will start and the connector will be destroyed.

One answer to this problem is to use connectors of the same metal as the cable. Then both connector and the cable will expand at the same rate and will always be tight. This would seem to indicate that aluminum-to-aluminum joints should be made only with aluminum connectors.

However, a copper connector, tin-plated and designed for use on aluminum, can be used with success. The emphasis is on design. The usual run of copper connectors you are using on copper installations will not do. The copper connector used on aluminum must be designed to handle the difference in expansion of the two metals. But springiness can be designed into the connector to absorb any motion that takes place due to the difference in expansion between copper and aluminum.

Connectors not only have to be designed to take care of normal heating caused by proper loads on cables. They also have to take care of the overheating caused by short circuits. After such a fault, you cannot expect your electrical department to go over all connectors in the systems to see if they are tight. The designer has to take care of these unusual stresses in his connector.

Problem 4 · ELECTROLYTIC ACTION

Electrolytic action may take place when two dissimilar metals are joined together and moisture is present. As the majority of electrical connections in an industrial plant are made indoors, this problem is not as serious as the first three mentioned. However it is well to take it into consideration, for you never know when moisture will occur.

Here is what causes the trouble: When two different metals are pressed together and they get wet, they make a miniature electric cell. One of the metals is eaten away like the zinc plate in a wet battery. Suppose you have an aluminum cable and a copper connector, or an aluminum connector and a copper bus bar. When such an electrical joint is exposed to salty atmosphere or damp industrial atmosphere, it is the aluminum that is corroded and eaten away.

The best way to prevent this corrosive action is connect aluminum only to aluminum. But, of course, this is not always possible. In fact, in your plant it is mostly impossible. You will have to connect your new aluminum conductors to present copper installations.

For dry locations and for normal indoor usage, the standard-finish aluminum terminal may be bolted directly to copper. For outdoor installations or in severe corrosive atmospheres, the aluminum lug should be tin-plated. Tin is a buffer material, not so positive as aluminum or so negative as copper. Used between copper and aluminum, it minimizes electrolytic corrosion.

Sealing compounds that combat oxide film also are effective; they keep moisture away from the electrical connection. If your electricians do a good taping job on the joint, that will offer good protection against moisture, too.

Another hint: Put the aluminum conductor above the copper conductor. If the aluminum is below the copper, moisture containing dissolved copper salts will collect in the joint and accelerate corrosion. When copper is below the aluminum, these dissolved salts will flow away from the joint.

Some utilities have been having a lot of success lately using compounds containing silicones as protective coating on aluminum joints. These compounds are non-melting, even in temperatures up to 400F. They're also waterproof.

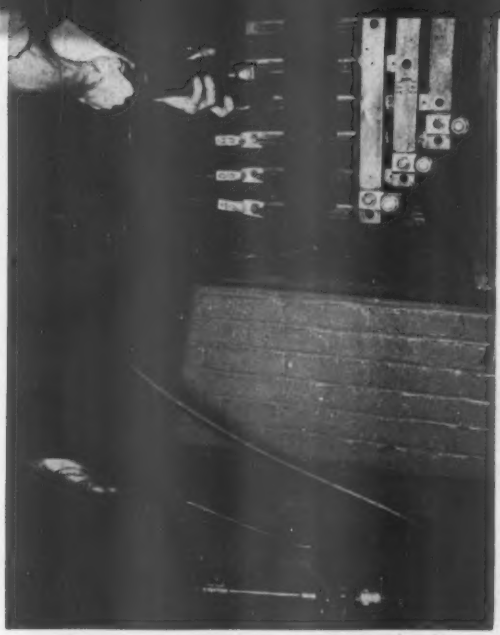
Problem 5 · MECHANICAL DAMAGE

Aluminum is very susceptible to mechanical damage. A small knife cut in a strand will make it break if the cable vibrates or bends. Be careful when removing insulation from aluminum cable. Don't circle the insulation with a knife; pare it off as if sharpening a pencil.

When bolting down an aluminum lug, use large flat washers. If the connector uses aluminum bolts instead of conventional hardware, your electricians will have to go a little easier on the wrench when tightening the joints.

Problem 6 · COMPRESSION FITTINGS

The best mechanical joints on aluminum connectors are made with compression fittings. These fittings are made up to fit snugly over the cable. A die



YOU CAN CRIMP fittings on aluminum cable with a compression device. A foot-operated hydraulic pump supplies pressure for this one. It puts on just the right amount of "squeeze."

is then placed over the fitting and the barrel or tube is crimped to create the pressure required for the joint.

One device for applying this pressure is a hand-operated tool, using pressure supplied from a foot-operated or hand-operated hydraulic pump (picture above). Or you can get a compression tool that has an electrically driven hydraulic system.

Compression joints are successful because the tools apply the correct crimping action with just the right amount of pressure on the cable, and because every joint will be the same. You don't have to depend on the judgment of the electrician in deciding what is "tight."

THESE PROBLEMS ARE BEING LICKED

Do all these warnings tempt you to give up the idea of using aluminum cable? Actually the picture is not as bad as it seems. The problems I've discussed have been solved by the connector manufacturers. The troubles described have been "designed out" of the connectors you will buy. Research is going on day and night to make connectors better—and easier to apply.

Training your electricians to handle aluminum conductors and cable shouldn't offer great problems. Most of the troubles outlined in this article can be just as bad with copper if your men do sloppy installation jobs. Here's the difference: You'll seldom *hear* of these troubles when your men are handling copper. But let a connector go bad on the "new" aluminum job and aluminum will get the rap. The excuse: "It's just a bad connector, that's all." You'd better check to see whether poor workmanship—probably due to lack of training—caused faulty installations.

Two Examples of Success

1. In a steel mill, circuit breakers rated from 2000 to 6000 amperes are located close to the machines whose circuits they govern. These circuit breakers down through the mill are connected by a bus 10,000 amperes in capacity and completely aluminum.

The circuit breakers use copper conductors, because it was deemed unwise to change their design. So, when the installation was made, the engineers had to select a point to switch over from the aluminum of the bus to the copper of the circuit breakers. They decided to switch over at the bus itself.

To connect the circuit breaker to the bus, flat copper bars were run from the circuit-breaker studs up into the bus. The joints were made by cleaning the aluminum under a protective coating, then bolting up the joints, using a somewhat larger bolt than would have been used with copper bus.

The installation was made in 1934. It was checked two weeks ago. There has not been a minute's trouble with that installation. It is indoors, and the air in that particular part of the mill is fairly good—although it is a steel mill, and there are plenty of contaminants in such a place.

2. This is an installation where copper terminals are connected to aluminum—outdoors. It's in Charleston, W. Va., in the center of a chemical industry where corrosive agents are in the atmosphere. The installation has been in operation for several years. When asked whether there had been any trouble, the chief electrical engineer didn't seem to understand why he was asked. He took it as a matter of course that there would be no special trouble. To him, it was just another electrical connection.

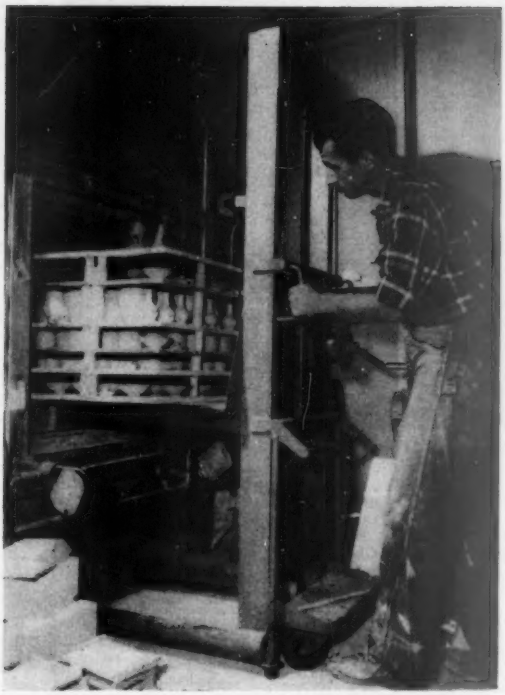
TO SUM UP · Your biggest headache with your electricians in putting in aluminum will be to get them to **handle aluminum as aluminum and not as copper.** You'll have to train them to use proper connectors, designed for aluminum—instead of using just any old connector that happens to be around.

Don't think of aluminum as an "experimental substitute" for copper. You will not be pioneering. Aluminum is no longer a substitute for copper. It can stand on its own feet and make a bid for use in your plant.

DID YOU MISS last month's article comparing the usefulness of aluminum and copper conductors? It's full of savvy on an up-to-the-minute subject. FACTORY, September 1952, page 132.

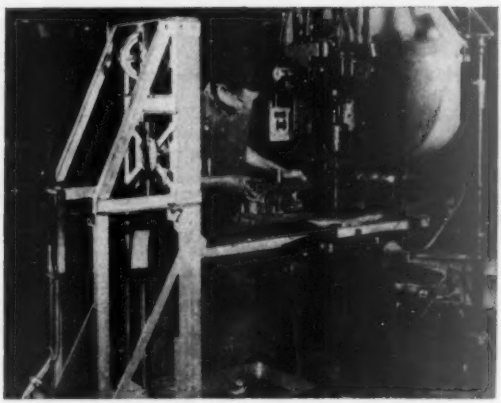
Use it in PRODUCTION...

. . . **TO LOAD A MACHINE** • This electric elevator-on-wheels lifts heavy casting to drill table so operator can easily position it by hand. Cable brings the current.



. . . **TO CHARGE A FURNACE** • Pottery is put in the kiln with the greatest of ease — and safety. Elevator lifts 500 pounds with care and dispatch by means of a hand-turned winch.

. . . **TO HANDLE BIG DIES** • Roller-top table and winch-operated cable fit this elevator for big jobs. Here's how one man pulls a heavy die out of the press.



. . . **TO HANDLE SMALL DIES, TOO** • Here a 500-lb. elevator brings a small die up to table height. Elevator drops down on two legs, to prevent rolling, when pulling handle is pushed out of the way.

Use it in MAINTENANCE...

. . . TO MAINTAIN EQUIPMENT • Maintenance man has a working platform at exactly the right height for servicing this die press. Foot-operated floor lock holds elevator steady while man is on it.

. . . TO SUPPORT LONG STOCK • It's no problem at all to support the free end of this long angle while operator saws off a length. Elevator can be adjusted to match height of machine bed exactly.

It's an all-round work-saver...

...YOUR PORTABLE ELEVATOR

IF YOU THINK portable elevators are just old-fashioned stackers, have a look at the photographs on this pair of pages.

Time was, of course, when you saw portable elevators principally in warehouses—piling up goods. And they're still good at that kind of work because they can work to great heights, maneuver in narrow aisles, handle bulky and unusual loads efficiently.

But that's far from all. Portable elevators are doing a wide variety of production and maintenance jobs in industry today. The photographs give you a hint of the main areas where they're making themselves decidedly useful.

The portable elevator is useful because essentially it is much like the lifting end of a power fork truck. However, it is primarily intended for lifting. While it can travel horizontally, this is usually the least important part of its job. It's light enough so that it can easily be pushed around the shop. Its construction is so simple that it needs little servicing or upkeep.

BENEFITS • Invariably, the portable elevator replaces the labor of one or more men. In addition to labor savings, it frequently increases production, cuts down on lifting accidents.

So take another look at the photographs. Think of the portable elevator as an efficient and inexpensive extra pair of hands. Apply this kind of thinking to your production and maintenance operations—and you may come up with a couple of ideas as to how you, too, can profitably add a portable elevator to the materials handling equipment you're now using.

THEY GAMBLED No automatic sprinklers. No fire walls to stop the flames from spreading. Loss: $2-million.

THEY LOST. So will you—so...

Why Gamble With Fire?

By CHESTER I. BABCOCK • Director, Fire Record Department, National Fire Protection Association, Boston

Why, indeed? Yet plants do it every day—ignoring safety principles they've known for years. That's the major conclusion drawn from a study of 1951's worst industrial fires.

We pass it on to you for study—*and action*. Let it help you make this month—and every month—truly "Fire Protection Month."

To test your reading ability...

Read this article at your normal rate of speed for general information.

Record your exact reading time in minutes and seconds. Then turn to page 328 and answer the 10 questions based on the article.

SPARKS FROM A METAL GRINDER started a $2-million fire (photograph above) in a machine shop in Upper Sandusky, Ohio. For a minute or two the flames would have been an easy out for a fire extinguisher—if the extinguisher hadn't been empty. After that, they swept through the 55,000-sq.-ft. ground floor, because there were no automatic sprinklers and no fire walls to halt them.

Plain neglect, you say? Of course. But it was neglect like this that cost U. S. industry more than $302-million last year.

Many losses were in the relatively small $1000 to $25,000 class. In most of these cases, work schedules weren't seriously interrupted. But there were

THEY GAMBLED No watchman. No automatic protection. An outsider turned in the alarm. Loss: $435,000.

102 industrial blazes last year with individual losses of at least $250,000. This handful of fires killed 33, injured 146, and cost $55-million.

Plants were destroyed, men thrown out of work for long periods. Even when production was resumed, it was on a reduced schedule because of stock and machinery shortages and lost customers. These are the tragedies that show how much you stand to lose when you take a chance with fire.

We analyzed the 102 worst fires to find out why they reached disastrous proportions. What did we discover? That complex problems were responsible? That industry lacks the know-how to cope with modern fire problems?

No. Instead we reached one conclusion:

Basic principles of fire safety—known for years—are being ignored by many industrial plants. These principles are obvious—one possible reason why they are often overlooked. Failure to apply them has been the most vital factor behind the largest industrial fires.

Four of these principles are: (1) prompt fire detection; (2) prompt alarm transmission; (3) effective fire extinguishment; (4) subdivision of fire areas.

But you'll rarely hang an industrial fire disaster on neglect of just one principle. You'll almost always find a combination of them. So if you want to squelch a fire before it reaches disastrous size, don't slight a single safety rule. Stick to them all.

Now let's look closely at the four principles.

1. Discover fire fast

You'll have to discover fire promptly if you expect to hold down damage. Fire chiefs will tell you the first five minutes are the most important. But when flammable liquids, gases, and combustible dusts are involved, even a 5-min. delay is too long.

When fires made headway before discovery, we found they usually occurred during off-hours in buildings without watchmen, detection equipment, or automatic sprinklers. Yet industry often gives this alibi for slighting detection facilities: *Most industrial fires* (it says) *are caused by operating processes and thus start when someone's on hand to discover them; also, industrial buildings are usually occupied for longer hours than other buildings, such as stores.* That's true. But the fact that

one-third of 1951's worst industrial fires occurred during non-operating periods should prove the need for around-the-clock detection facilities.

What happens when you gamble your plant operation against fire detection costs?

• Fire broke out March 10, 1951, in a Champaign, Ill., foundry (photograph, page 127). There was no watchman, no automatic protection. So flames had plenty of time to spread before they were discovered at 2 A. M. by an outsider. Loss: $435,000.

Substandard watchman protection may be no better than no watchman at all. This was true, we found, in 13 of 1951's worst industrial fires. For instance, what are the chances of discovering an inside fire promptly if the watchman is hired to patrol outside the building only?

• In Lewiston, Idaho, a $252,000 feed mill fire was first noticed by a passerby at 1:35 A. M. He drove to the fire station, arriving just as a telephone alarm was received from the watchman, who had been ordered to patrol outside the mill only.

Limit your inside patrols and you're also asking for trouble.

• A $641,000 fire wrecked a Los Angeles plant last December 9, a Sunday. The blaze was reported at 11 A. M. from an airport control tower about a mile away. Firemen arrived to find the entire roof in flames. Watchman protection was limited to two inside daytime patrols on Sundays, and the last patrol was two hours before the fire was spotted. What's more, the 30,000-sq.-ft. building had neither fire walls nor sprinklers. The plant made protective clothing and industrial safety equipment.

FACTORY says: Too many watchmen are assigned their jobs because they're too old to do anything else in the plant. Result: Watch tours are made easy and coverage is not complete.

In planning your watch tours, pay special attention to fire hazard areas. Cover them more often than others. The old method of ringing a clock once an hour all over the plant is not always good fire protection.

2. Turn in alarm instantly

So your watchman discovers a fire before it gets a head start. Fine. Next step is an immediate alarm. The longer the alarm is delayed, the less chance firemen have of controlling the fire.

Sounds obvious, doesn't it? Yet many plants haven't made this point clear to their watchmen and other employees. In some fires we studied, it almost seemed that orders had been issued to call the fire department only as a last resort. But probably this rule is violated so often because it appears so self-evident that managements neglect stressing it to their employees.

Remember this: Your local fire department is waiting in the station. You help pay for it. Give it a chance to serve you well by sending alarms promptly. Any fireman would rather make 10 trips and find the fire out than spend six hours on a hose line because the alarm was delayed.

• In Arlington, Va., last December 28, a watchman discovered a fire in a first-floor office of a 2-story planing mill. He emptied two extinguishers on the blaze, then tried to use the office telephone, apparently put out of service by the fire. Finally, he ran a block to a gas station and gave the alarm. When firemen arrived, flames were out of control in the unsprinklered mill. Loss: $300,000.

• In a saw-making plant at Clinton Township, Ohio, oil was being transferred from one tank to another last October 30. It splashed on a furnace and burst into flames. Employees emptied 21 extinguishers before giving the alarm 20 minutes after the fire started. Loss: $350,000.

• In Owosso, Mich., fire gutted a sandpaper and emery wheel plant in March 1951. Flames started in a 40 x 380-ft. drying tunnel. Unsprinklered, the tunnel contained thousands of feet of festooned paper. The fire destroyed the tunnel, machinery, stock, and most of the sprinklered, 1-story, 184,000-sq.-ft. building. Big reason for the heavy damage was lack of sprinklers in the tunnel. But the watchman's actions also played a part. He tried to fight the blaze with an empty extinguisher, then wasted several minutes telephoning the alarm because he didn't know there was a fire alarm box outside the building. Loss: $1,250,000.

FACTORY says: Mark your fire alarms so you can find them in a hurry. Don't count on signs pointing to them. Red lights may be misleading because they're used for so many other purposes in plants. Dark blue lamps, 75 watts or larger, make fine markers for alarm boxes. They surround themselves with a blue halo that's easy to see from a distance.

3. Fight the fire effectively

You're all set to report a fire promptly. But are there strong facilities available to fight it? What about a plant fire brigade, public fire departments, adequate water supply, and, of course, sprinkler protection? Here's another safety principle that seems self-evident.

Yet look at the record of 1951's 102 worst industrial fires. Five plants were in areas without public fire departments; 23 were in towns too small to provide protection against large industrial fires. Of these 28 plants, only 3 had their own fire brigades. Sprinklers were absent in 70 of 86 fire-struck

plants that could have been equipped with them.

Here are results of inadequate facilities:

• A fruit packing plant in Hollister, Calif., had neither public nor private fire protection. It was wiped out by a $436,000 fire in January 1951.

• Lack of water was the key factor when a $450,000 blaze swept a fur dressing plant in suburban Montreal last October. Sprinklers functioned, but on only 26 pounds' pressure at the hydrant. That wasn't enough to check the fire's spread. Weak water pressure also hampered fire department pumpers. When the sprinklers were installed, pressure was 75 pounds, and a gravity tank provided more water. Later the gravity tank was moved. and new buildins nearby put too much drain on the available water supply.

There were 16 disastrous fires last year in sprinkler-protected plants. But that's no indictment of sprinklers. It's an indictment of those responsible for fire safety.

• A $415,000 blaze roared through a Hagerstown, Md., furniture factory Feb. 25, 1951. Flames, reported by a passerby, were out of control when firemen arrived. Sprinklers failed because of only 5 pounds pressure at top lines, a poor water supply from a 4-in. public main, and an obsolete sprinkler system complying with 1896 standards. There was no supervised sprinkler alarm. A second water source—a gravity tank—had been discontinued.

• A Chicago mattress factory was equipped with sprinklers. It had fire walls with protected openings. It was served by a strong fire department. Yet it was gutted by a $1-million fire last November 17. Why? Because flames started in a section where the sprinkler valves were closed.

Sprinklers have given 96% satisfactory performance. Most of the remaining 4% can be traced to poor maintenance. If you want sprinklers to do a job for you, keep them in good shape.

FACTORY says: Don't be fooled by false security. Neglected fire fighting equipment is worse than no equipment at all. When your equipment is out of order, fix it. And give repairs top priority.

"Just one more room." That's the first step in breaking down your sprinkler protection. Don't add too many heads to your sprinkler system. You'll overload it.

If you're moving your plant to a new area—particularly a small town—don't take fire protection for granted. Maybe the local fire department isn't equipped to handle large industrial fires. Good idea: Call in the fire chief, and ask him what protection your factory can expect.

4. Break up areas with fire walls

Small fire areas mean small losses. If your fire prevention program slips, if your watchman isn't on the job, if your sprinkler valves are closed—the size of the fire will still be limited by the size of the area in which it starts.

Sure, some modern assembly-line operations call for areas measured in acres instead of square feet. But you can still follow these basic rules:

1. Limit areas to the size absolutely necessary.
2. Segregate special hazards.
3. In necessarily large areas, put special stress on fire detection and control facilities.

Of last year's disastrous industrial fires, 62% reached "large loss" proportions because they occurred in plants that weren't reasonably subdivided. Those plants gambled on a win-all, lose-all basis, but the odds were stacked against them.

• Hardly a disaster ingredient was missing in a $332,000 fire at a San Jose, Calif., ladder factory Sept. 7, 1951. No watchman. No automatic detection. No sprinklers. Outsiders discovered the blaze, squandered 10 minutes trying to fight it, and then sent an alarm. Wood dust on rafters speeded the flames' spread. Firemen were handicapped, because hydrants were a long way from the factory. Yet most of the 64,000-sq-ft. building would have been spared had it been subdivided by fire walls.

• A prisoner "ditched" a cigaret, and San Quentin Prison lost a large jute mill in April 1951. Flames flashed over stored jute bags and along the lint-covered ceiling. Prison firemen answered the alarm in 90 seconds, but the wooden roof was already ablaze. The 80,000-sq.-ft., unsprinklered mill wasn't divided by a single fire wall.

When is a fire wall not a fire wall? When its openings aren't protected.

• Damages came to $517,000 after a fire Sept. 15, 1951, in a Peoria, Ill., stove and furnace factory. The 2- and 4-story brick and wood-joisted building lacked a watchman and automatic protection. Stair and elevator shafts were open. Doorways between two sections were unprotected. But double fire doors in fire wall openings kept flames from spreading to a neighboring 4-story building.

So you build fire walls and protect openings with fire doors. But if the doors can't function in a fire, the walls might as well not be there.

• A $1-million blaze destroyed two-thirds of a sprinklered Cleveland plant last November 1. The 2-story building was divided into three sections. Flames should have gone no farther than the first-floor center section where they started. But they mounted quickly to the second floor through stairway closures that were blocked open. There the fire spread to other sections because fire wall openings were unprotected and fire doors were wedged or blocked open.

FACTORY says: Maybe your plant has adequate fire walls. But there is always the industrial engineer who wants to cut an opening to put through a conveyor. It'll save you $100 a month, he says. But what he doesn't say is that it could cost you a $100,000 fire loss.

NON-DESTRUCTIVE TESTING

gives you fast, on-the-spot maintenance inspections...

By A. GOBUS • Head, Non-Destructive Testing Department
Sam Tour & Company, Inc., New York

NON-DESTRUCTIVE TESTING permits inspection of many elements of building structure and equipment without cutting, drilling, or in any way damaging the installation. Equally important, inspections can be made in the plant, usually without dismantling equipment or property.

The term "non-destructive testing" does not apply to any single technique. Actually, it applies to a number of methods for testing and inspecting materials. These methods use a variety of scientific tools. Five of the more important may be classified broadly as radiography, electrical conductivity, ultrasonics, magnetic fields, and liquid penetrants.

Using the devices or techniques associated with each of these fields will produce certain information about a piece of equipment. But will the information be useful to you? Not necessarily, unless you take these three steps:

1. Decide what information you want. You have to know enough about the material being tested to know what information is needed to give an adequate inspection picture.

2. Choose a test that will give you the information you want. That means knowing the advantages and the limitations of the various testing methods. Sometimes you can get a particular bit of information in either of two ways. At other times, a combination of tests must be used.

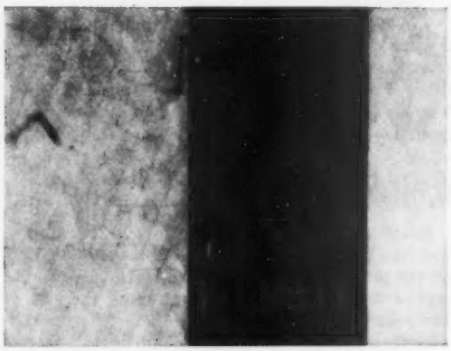
3. Submit your test data to someone who is competent to interpret and evaluate it.

Whether such testing should be conducted by plant personnel or by an outside organization is a matter of economics.

Purchasing and maintaining the variety of equipment required and training the personnel to use it is expensive. If the maintenance job is a large and continuing one, it may be warranted. And there's the possibility some of the equipment and personnel might also be used on non-destructive *product* testing.

As an alternative, there are a number of competent consulting and testing organizations. They have the specialized equipment and trained personnel needed to give you accurate, dependable inspection results.

To give you an idea of how non-destructive testing can help your maintenance program, here are brief descriptions of some of the major types of test equipment, together with case histories from our files.



COBALT-60, one of AEC's new radioactive isotopes, makes a picture of pipe and reinforcing through a concrete floor.

...with RADIOGRAPHY

This is an industrial X-ray process. The radiograph is made by passing the radiation from X-ray tubes, radium, cobalt-60, or other radioactive materials through the test object onto a sensitized film. Internal defects (flaws, cracks, foreign matter) can be located quickly and accurately in welds, castings, hidden beams, piping, valves, etc.

CASE HISTORY • Location of Hidden Pipes and Beams

Problem: This one came up in our own back yard. We had to run a pipeline through the two upper floors of our building and out through the roof. To get the line in with minimum expense and delay, it was necessary to know the location of beams, conduits, and other obstructions in order to avoid them. The building plans had been lost, thus giving us the problem of finding all the possible obstructions before beginning work.

Solution: After selecting the general area for in-

stallation of pipe, we radiographed that area on the successive floors and roof. This was done by placing the film on the flooring and fastening a capsule of radium to the ceiling below. We got an exact picture of the obstructions in the path of the pipe and installed it without difficulty.

By this simple expedient, we did the job without the need for exploratory drilling and with minimum damage to flooring and roofing.

ELECTRICAL STRAIN GAGE is used to check stress caused by internal pressure in this pipe.

...with CONDUCTIVITY

When a wire loop is stretched or compressed, its electrical conductivity changes. If the loop is placed in one leg of a Wheatstone bridge and firmly attached to the object under test, the amount of unbalance in the bridge will give an accurate measure of either static or dynamic stress in the object.

Such electrical strain gages are useful in measuring stress in beams, supports, forgings, or equipments subjected to mechanical loads.

CASE HISTORY • Checking Building Column Loads

Problem: Plans for modernizing a building called for removal of a supporting column and the transfer of its load to another column several feet away. A girder was installed to carry the load, estimated at 200 tons, from the old column to the site of the new one. Some positive means was needed to make certain that, as the load was being withdrawn from the old column, it was being supported by the other column. We were asked to provide this check.

Solution: We fastened electric strain gages to both the new and old column to indicate the load on each support as the operation progressed.

As an increasing amount of the load was being removed from the old column, the strain gages indicated that it was not being shifted to the new support. Work was halted immediately and emergency supports were erected.

The method of taking up the shift in load was completely revised and the remainder of the job, again supervised with strain gages, proceeded without difficulty.

HIGH FREQUENCY "ECHO" picked up by this Audigage spots variations in pipe wall thickness.

...with ULTRASONICS

Sound waves of high frequencies (above the range audible to the human ear) can be used effectively to check metals and other sound-transmitting materials for thickness or internal flaws.

We use two types of instruments for such jobs:

The Audigage transmits a signal of variable frequency. The frequency of the signal that causes the material to vibrate at its natural resonance frequency is a measure of the thickness of the material. The Audigage will measure thickness of ⅛ inch to 12 inches, sometimes at the rate of 30 measurements per hour. Within certain limitations, the instrument can also be used for detecting internal flaws and interfaces between adjoining layers of material.

The Reflectoscope sends out a signal of constant frequency. The elapsed time for the "echo" to return from the opposite surface is indicated on an oscilloscope. Secondary echos from flaws or interfaces show up as smaller "pips" on the scope. Scaling the distances between major and minor pips gives you the exact location of the unwanted reflecting surface (internal flaw).

CASE HISTORY • Location of a Hidden Roller Seam

Problem: A steel fabricating company had a set of 30-in.-diameter, built-up, cast steel rolls which had been extended to 40 feet in length with an added section. New processing requirements made it necessary to shorten the rolls to their original length.

Exploratory cutting of the roll could not be attempted because of the danger of cutting into the

journal hub of the original roll and thereby ruining the entire roll. One way of finding the seam would have been to gradually shave off the end of the roll on a lathe to the journal hub, marking the end of the original roll. However, that would have been expensive and time-consuming.

Solution: An Audigage brought into the plant located the seam and the end of the journal hub within an hour. From the readings obtained, shop men were given the exact point at which to begin cutting. In a matter of a few days, the roll had been cut down to its original size and was back in service.

As a result, the job was accomplished at a saving of several thousand dollars in shipping and machining costs and several weeks of downtime, without danger of overcutting and ruining the rolls.

...with MAGNETIC EFFECTS

Unless it is interrupted in some way, a magnetic field will conform to a definite and predictable pattern. Furthermore, changes in a magnetic field (such as produced by "interruptions" or discontinuities within the field) will affect the flow of electric current. These properties of magnetism are the basis of two pieces of non-destructive test equipment we use.

The Magniflux is used for magnetic particle inspection. Iron filings, dusted on the surface of a ferrous metal object, arrange themselves into a characteristic pattern when subjected to a magnetic field. Cracks or flaws in the object disrupt the normal pattern. Proper interpretation of the resulting pattern will locate internal obstructions.

The Probolog indicates variations in the wall thickness of pipes or tubes. It consists of a magnetic probe in which eddy currents are generated and graphically recorded. The nature of the eddy currents is changed by variations in the wall thickness (including pitting and corrosion) as the probe is drawn through the tube. It permits location of flaws without removing the tube from its normal location.

CASE HISTORY • Inspection of Heat Exchanger Tubes

Problem: A heat exchanger in a chemical plant had been in service for a number of years. The plant managers suspected that corrosion had thinned the exchanger tube walls to the extent that they constituted a hazard to plant personnel and property. The tubes were 20 feet long and had an outside diameter of ½ inch. The problem was to inspect the tubes accurately and with as little disruption of plant operations as possible.

Solution: To do the job, we selected the Probolog because it would permit us to inspect the tubes without removing them from the heat exchanger. After establishing a zero reference on our recorder for an unused pipe of the same dimensions, we began taking readings on the heat exchanger tubes. Substantial deviations from the zero reference would indicate serious thinning or corrosion of the tube wall.

After inspecting each tube of the exchanger, we found that the entire unit was in excellent condition and required no replacement. Thus, in a few hours we were able to make an informative inspection of the unit and enabled the plant to continue to use the equipment with confidence and without unneeded replacement.

...with LIQUID PENETRANTS

Some liquids have the ability to penetrate into very tiny cracks and crevices. This can be a most useful way of locating surface flaws if the penetrating liquid can be given a high degree of visibility. The technique is to spread the liquid over the entire surface to be inspected, and then *wipe* the surface clean. Liquid that has penetrated tiny surface flaws will remain. We use two different types of liquid penetrants:

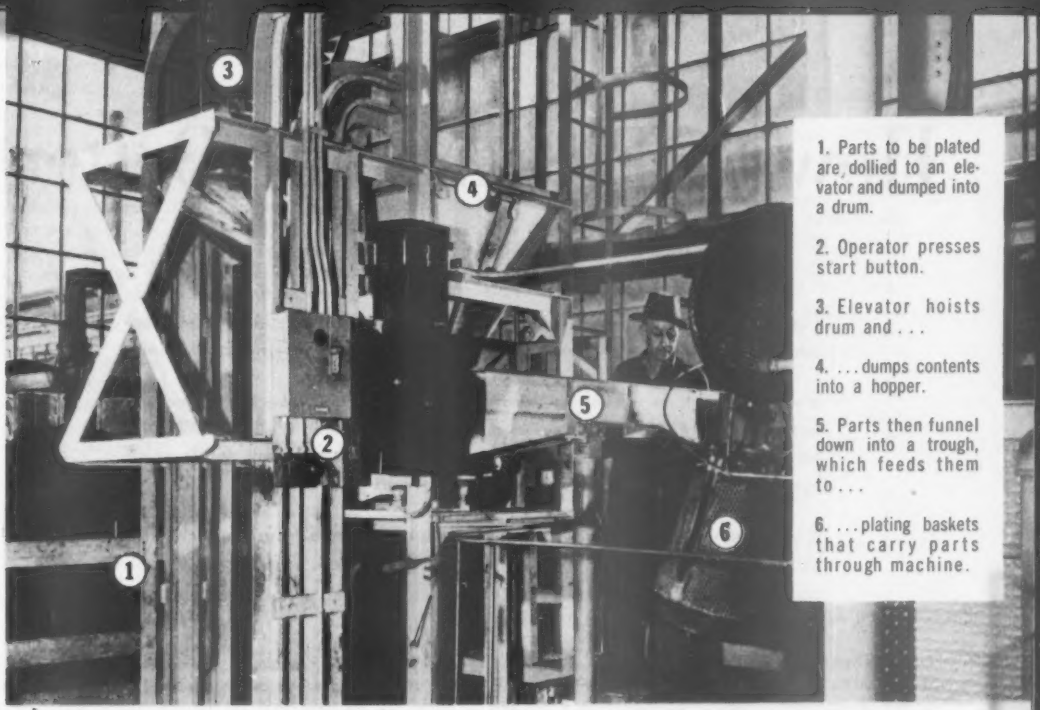
Dy-Check contains coloring matter. In any but the tiniest cracks it is visible to the naked eye under normal room illumination. (Certain colors and types of finishes may decrease the visibility of this type of penetrant.)

Zyglo is a self-fluorescing liquid. That is, it has a tendency to glow in the dark. With the aid of a developing powder to increase visibility, even the tiniest surface flaws can be located under ultraviolet light.

CASE HISTORY • Location of a Leak in a Corrosive-Handling System

Problem: A newly-installed section in a chemical plant contained equipment for handling a corrosive liquid at high flow rates and elevated temperatures. Because of the hazardous nature of the liquid, the company organized a testing crew to inspect the piping for possible leaks. Periodic inspections were made of the system, using radiographic techniques, such as X-rays and gamma rays. Nevertheless, a leak appeared in a valve assembly which could not be located by radiography. Because the defective valve had passed several radiographic inspections, it was evident that new or supplementary procedures were needed to improve the accuracy of present methods.

Solution: The use of Dy-Check solution located in a matter of minutes the leak that escaped detection by radiography. The fault lay not in the radiography, but in attempting to employ the method where it was not suited. Gamma rays do not give a useful picture with thin-walled piping; X-rays will not locate cracks unless the cracks happen to be oriented at nearly right angles to the direction of radiation.


1. Parts to be plated are dollied to an elevator and dumped into a drum.
2. Operator presses start button.
3. Elevator hoists drum and . . .
4. . . . dumps contents into a hopper.
5. Parts then funnel down into a trough, which feeds them to . . .
6. . . . plating baskets that carry parts through machine.

AUTOMATIC LOADING — with no sign of manual handling—gets Ford small-parts plating process off to a perfect start. All operator does is control the operation. His main job is to push the button that starts the elevator that dumps parts in the drum.

Better handling the key at Ford to . . .

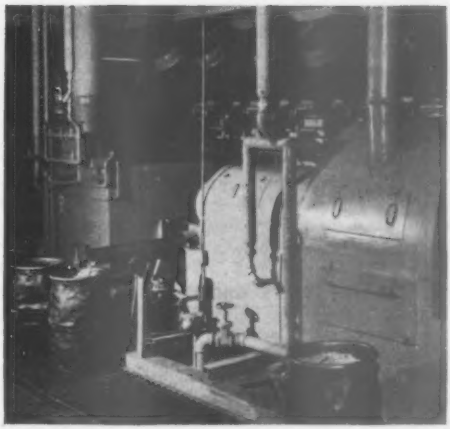
A 150% Increase in Plating Output

TO GET THE MOST out of any automatic machine or process, you have to get the work into it—and out of it—with least possible manual handling.

Ford Motor Company comes close to that ideal in the new small-parts plating process that has increased its production 150%. Much of the credit for the increases must necessarily go to a new plating machine. But Ford never could have pulled it off without better handling—mechanical loading and unloading.

It takes two men to run the show — the old way required three. One man pushes the button to start the elevator and controls the operation. (See photograph above.) The basket moves through the plating cycle, then dumps the parts into the cleaning operation. Finally, parts flow through an inclined tube into drums. The second man pushes the drums along a roller conveyor to the removal point.

Ford's new set-up produces 3000 pounds of parts an hour. The old rate was 1200. That's an increase from 400 to 1500 pounds per man-hour.



AUTOMATIC UNLOADING writes "end" to Ford's new plating process. Second man spots drums under spout, moves them away.

How to Pick People Better

By JAMES D. WEINLAND • Professor of Management, New York University

This article isn't for professional interviewers. It's for amateurs—the thousands of executives who spend part of their time interviewing job seekers.

It's for large-plant executives who see applicants that have been carefully screened beforehand by the personnel department. And it's for small-plant executives who talk to less carefully screened candidates from employment agencies, the state employment service, or right off the street.

It won't give you any magic formula for better selection. But the ideas in it will save you time and money and gain you better employees—if you really put them to work on your job.

ONE EXECUTIVE I KNOW says he can size up anybody in two minutes. Another insists he can tell whether or not a girl will make a good secretary by the way she walks. Another reports he has "never made a mistake in hiring people."

Unbelievable? Not at all. These are quite common examples of a dangerous superstition harbored by some executives: *that they are infallible judges of people.* The sad fact is, they're wrong.

For example: The man who "never made a mistake" won't talk about a young trainee he interviewed a few years ago. But the trainee will. Our confident friend interviewed the trainee for a possible promotion after the young man had been in the plant about a year. After a brief conversation, the executive concluded that the young man didn't have the qualities needed to advance.

The trainee was so impressed with this evidence of interviewing skill that he quit. Within a week, he had a job with a rival company. He has since enjoyed a number of promotions and is obviously headed for the top. He tells this story with glee.

Naturally *you*—the reader of this article—wouldn't fall into the trap that caught the executive in the anecdote above. But, just in case you might be *tempted* to become a "snap judgment interviewer," let's review a few . . .

IMPORTANT FACTS ABOUT INTERVIEWING

1. Interviewing is hard work. There are no simple formulas that you can rely on to get you over the necessity of discovering a great many facts about an applicant and weighing them in making a decision. There are short cuts, of course. But at best they merely simplify the job of gathering information.

2. You can't safely bypass the interview in selecting people. A large Eastern manufacturing company learned this lesson the hard way.

This company annually picked three topnotch college graduates out of a group of twenty. Selection was based entirely on the men's college records, plus a composition on a specified topic. A few costly failures led the company to add a personal interview to the selection method. The first year, they compared the old method with the new (interview added). Result: The two methods agreed on only one man out of the three! Incidentally, since the interview has been added to the selection process, the company has not had one failure.

3. Poor interviewing is costly. That's true no matter how you define "costly."

In terms of money, the direct recruiting and training cost for a replacement for a "bum choice" on a job can run up into thousands of dollars. Even simple shop jobs can show a "replacement cost" of a hundred dollars or more. For more complex jobs, the penalty for poor selection becomes enormously greater. For example, the direct cost of replacing an $8000 executive may be better than half his first year's salary.

But the direct cost isn't the whole picture. A square peg in a round hole penalizes his employer in terms of his poor performance on the job, too. There are no statistics on this, but the chances are good that the cost of ineffectual job performance is far greater than the cost of finding and training a new man. An executive I know in one company tells me he estimates that a bad guess on a chief industrial engineer (salary $10,000) cost his company $100,000 in profit in one year.

Poor selection can also cost you personally, in terms of time and effort. When you hire a man, you

hire an extension of yourself, since you can get things done only through and by others. If you make a mistake, it's like marrying the wrong girl—you have to live with a headache and wash the dishes besides!

4. Poor interviewing hurts employee and public relations, too. Like the bad apple, the poorly selected employee makes trouble, and passes it around to others. And, when a man is inadvisedly hired, then let go, he's apt to go about telling people what a raw deal he has been given. Such stories spread outside the plant as well as inside—which doesn't help public relations.

Why all this explanation of the importance of proper interviewing? For one simple reason:

Because interviewing is hard work, you may be tempted to grudge it the time it requires. Nothing could be more dangerous. If you skimp on interviewing, you trade disaster in the future for a slight release of pressure at the moment.

Well, what can you do about it? Fortunately, the "art" of interviewing can be learned. And, if you're already doing a good job, it can still be improved. The following ideas should do two things:

1. If you're not very good at interviewing, they should provide a solid base of fact and recommendation that will yield immediate improvement in the caliber of people you select.

2. If you're now a good interviewer, they should yield some useful stimulation—reminders of things you have long since known and perhaps forgotten, or not practiced as religiously as you might.

10 Ways to Improve Your Interviewing

1. ALLOW ENOUGH TIME

Abraham Lincoln once said that a man's legs should be long enough to reach the ground. In the same vein, an interview should be long enough to find the right man. To be more specific, research shows that diminishing returns don't begin to show in an interview until after the first 20 minutes. This suggests that you can allot 20 minutes to the average interview without wasting time.

Of course, some interviews will take more time. That will depend on the applicant and the complexity of the job. But it's not wise to run over an hour and a half. If you need more time than this, break it up into two or more interviews.

Naturally, the more skill you have and the more help you get, the faster the interview.

Regardless of anything else, of course, you can cut the time down simply by watching for the point when "your legs reach the ground." So, if you find an applicant won't work for the pay you can offer, or won't work the hours you specify, you're through. To save time, get cleared up early in the interview on such definite job requirements. You'd certainly not want to waste 20 minutes interviewing a cute little blonde for a job requiring a 6-ft. amazon.

Or would you?

2. KNOW WHAT YOU WANT

Too many non-professional interviewers are like the lunch-wagon owner I heard about not long ago. He had had a whole string of workers, each of whom had quit after a day or two. When asked what kind of man he needed, he complained bitterly:

"You just can't get good people nowadays. All I want is a satisfactory worker who will do the job."

The lunch-wagon owner's trouble is a fairly common one. Obviously, he had never taken the time to figure out just what each worker had to do, and just what kind of man was needed to do the work.

There's only one way to know the kind of man you want. That's to discover the kind of man the job requires. A careful description of just what has to be done on the job gives you a clean-cut guide as to the education, skill, experience, and personal qualities you should be looking for.

It's a great help to have such information for your own personal guidance. But, to get best results, it's important to go further. Share your information with others, so they can help you fill the job. If your plant has a personnel department, it's obvious that personnel ought to have all the information you can supply. Further, close co-operation with personnel after you have talked with applicants will help. Explain what was wrong with the applicant, and just why his experience wasn't appropriate.

Of course, the problem is tougher if you have no personnel department. But even so, you can share your information with employment agencies, the state employment service, or other outside sources that may supply some of your help.

Turn the page

3. USE ALL THE HELP YOU CAN GET

One obvious source of help has already been mentioned—the personnel department; or, if there isn't one, someone to screen applicants. The application blank has also been mentioned. The information it contains helps you size up the applicant beforehand and saves time in the interview by covering many topics that would otherwise have to be talked out.

Aptitude tests and other measures of an applicant's personal qualities are obviously of great value—if properly used and interpreted. If you have a testing program in your company, that's fine. Use the results as another source of reliable information about the applicant. But here are two important warnings about tests:

1. Unless you are a trained psychologist, beware of setting up your own little homemade testing program. Long and sad experience shows that you only hurt your chances of hiring good people that way. So don't do it.

2. Don't let test results blind you to all the other facts you have about an applicant. That sometimes happens. An inexperienced interviewer will ignore everything else, and accept or reject a candidate on the basis of test scores. Tests are helpful but not perfect, and they shouldn't be used that way. The only exception is where you're doing a preliminary screening and want to weed out applicants who are so obviously low that it would be a waste of time to go further.

A "patterned interview" guide is probably the single most helpful device you can use to improve your selection batting average. You can develop your own, but first you ought to see one or more of the good ones that are published commercially.

Basically, a patterned interview is just a way of organizing the interview to make sure you touch all bases. The guide is a checklist, in effect, that keeps you going in the right direction and insures that you don't forget important points.

Some interviewer's guides allow space for you to rate the job applicant on important factors. This enables you to boil down your impressions a lot more systematically.

Rating sheets often help interviewers, too. As suggested above, they are sometimes attached to interviewer's guides. But they can be used independently, of course. There's no standard form for such sheets, any more than there is for merit rating forms in industrial use. But they all have in common the fact that they list factors that are important to job success, and they have some provision for your personal evaluation. The evaluation may be in the form of written comments, a check mark on a numerical scale, a written symbol, or a check mark after one of a series of descriptive phrases.

A word of caution about interviewing guides and rating scales: *It's wise not to be too obvious in using these devices.* The interview can become strained and unnatural if it's too evident to the applicant that you're sizing him up as you go along. Keep your writing and note-taking down to a minimum during the interview. Make your notes afterwards. Especially, fill out your rating forms then. If you were orderly in your interview, you won't have any trouble remembering essential points.

And, by holding off till the interview is over, you'll have a better picture of the applicant as he really is. Also, you won't be wasting time changing your ratings as you learn more along the way.

4. SEE ENOUGH CANDIDATES

A full-time personnel interviewer will often screen dozens of application blanks, and actually interview five or six men to find one really-qualified candidate. For some hard-to-fill jobs, he may have to interview 20 or 30 men.

But such extensive searching is outside the limits of practicality for the average plant operating executive. He cannot afford to devote his full time to interviewing.

If you see the three best of a carefully screened larger group, you will probably be able to make a sound selection. But this assumes that you have a personnel department to do your screening for you. If you haven't, you can do two things that will help you keep down the number of interviews you have to give:

1. You can assign some member of your department to the job of doing the preliminary screening for you. Just remember that he or she can't screen properly unless you pass on good information about just what you want.

2. You can do a lot of screening by reviewing application blanks. Any good application blank will contain enough information to enable you to eliminate the *obviously* unsuited applicants. Maybe you will have to talk to more than the ideal three candidates under this plan. But you can cut down the work greatly.

One thing that's dangerous: Don't get into the habit of picking the first person you talk to. It's an easy habit to fall into. Even if you're positive you have just the man you want, it makes a lot of sense to see at least one more man—preferably the one who looks "next best" in terms of his application blank or someone's screening. A little precaution like this—at the cost of 20 minutes of your time—will sometimes save you from being mesmerized by a slick-talking "professional job hunter." There are people like that around.

5. SET THE STAGE RIGHT

Perhaps all this will sound perfectly obvious to you, and not worth discussion. It *is* perfectly obvious. There is only one reason for discussing it: The reports of literally hundreds of job-seekers convince me that many executives persist in ignoring the simple principles of courtesy and thoughtfulness that are really all the phrase "setting the stage right" means.

Of course, every interview should be held in privacy—which means at least out of ear shot of others. *Of course,* you shouldn't keep applicants waiting for hours, or standing uncomfortably while you conduct the interview. These are merely "mechanical details." But they need constant attention because, apparently, they are often forgotten. And when that happens, applicants are rightly bitter in their resentment—which they will freely express outside the plant.

Perhaps the most important point here is that, mainly, you set the stage for an interview inside yourself. If your attitude toward the applicant—or toward applicants in general—is right, you will probably see that the surroundings in which the interview takes place are right, too.

You can't look down your nose at applicants and do a good job. Incivility and thoughtlessness are terrible public relations, but they are also solid barriers to conducting a useful interview that really lets you size up the candidate you're talking to.

6. KNOW WHAT TO TALK ABOUT

In the heart of any interview, there are just three subjects for discussion—the job, the company, and the applicant. Except for the brief preliminaries of greeting the applicant and putting him at ease, these three subjects are all you should talk about. Unless you have a definite reason for them, digressions such as stories, personal recollections, and political prognostications are a waste of your time and the applicant's.

In discussing the job, it's a great time-saver to bring up the fixed requirements rather early. Thus, if there are definite requirements as to age, working hours or days, or geographical location, make sure the applicant understands these and qualifies for further discussion. This doesn't mean you have to scare the job seeker. But there's no point in spending a lot of time only to discover the candidate won't work the shift you have in mind, or won't travel to the location of the job.

Five main points should be briefly covered in telling about the job, once the fixed requirements have been dispensed with:

1. The job title—and relationship to other jobs. This includes the department in which the job exists and the supervisory level to which the applicant will report.

2. The main activities involved in the job: like walking, sitting, heavy lifting, rapid computation. Include also the experience, education, and training needed to perform these activities. A good toolmaker gets that way primarily by experience, a lawyer by training.

3. The main materials the man will work with, and the machines and tools needed.

4. The environment he will work in. It's especially important to forewarn him about undesirable features. Again, you don't have to scare him off. But you certainly want to make sure you're not hiring someone who will just add to your turnover after a few days on the job.

5. The responsibilities and rewards of the job. Here is a place for sound, factual "selling" of the job. Company policies, benefit programs, and promotional opportunities can be developed briefly. And, of course, this is the place to discuss the wage or salary scale, and the time and method of payment.

In discussing the company, it's helpful to have a short "canned" talk that gives the highlights of the company's background, its products, and its organization. Remember, you're not trying to give a detailed history here—just enough information to orient the applicant and show him you're proud of the company and consider it a fine place to work.

Discussing the applicant will naturally take most of your time. If you use some type of patterned interview guide, you will keep the discussion generally on the beam by suggesting the main points you'd like the applicant to talk about. But don't forget that the applicant is the expert about himself. As far as possible, let him carry the ball. Above all, don't talk too much yourself.

The psychologists have developed a technique called the "non-directive interview" for situations like this. Bluntly, this means "keep hands off as much as possible." Let the candidate tell you whatever comes to mind, even if he wanders afield. Stimulate further comments by mirroring whatever the interviewee has last said:

"So you worked five years at Acme and liked it, particularly the satisfaction of being your own boss?" "Yes," says the applicant, "I liked it very much." And so he goes on to explain it further.

Of course, you can't always afford the time to go on like this indefinitely. But it's well worth remembering that you'll learn a lot more about an applicant by letting him talk without too much direction than you will by asking him a series of detailed questions that he can answer practically yes or no.

Turn the page

7. ASK THE RIGHT QUESTIONS

Even a little interviewing experience reveals that changing the form of a question often makes it bring out quite different kinds of information. If you are reasonably familiar with the different forms that questions can take, you can do a much more flexible interviewing job.

Here are several different kinds of questions you can work into your interviews:

1. Quieting, confidence-winning questions—used to put an applicant at ease. You ask the "Nice day, isn't it ?" type of question here—not to get information but to get things rolling easily.

2. Directing questions—used to explore a definite topic. "Now what about your education; where did you attend school?"

3. Stress or "tough guy" questions—used to bring out a little better picture of the man's personal qualities than a cozy little interview usually reveals. Such questions are a legacy of war. The army rule is, "Don't hit him or kick him, but say anything to him you want to." But watch out for stress questions. And be prepared to counteract them later with some heroic public relations work.

4. Challenging, arousing questions—used to stir up the occasional applicant who just won't talk. "Of course, I wouldn't want you to explain anything you don't understand," is an example. It is said that a similar approach used to help reporters when Herbert Hoover was president. When he wouldn't comment, they would sometimes question the accuracy of a fact he had given them, and immediately get a detailed response.

5. Consistency or "cross examination" questions—used to test out features of the applicant's story. "Let me see now, who was it you said you worked for in 1941?" "What did you do just before you took that job at Ford?"

6. Narrative and organizing questions—used to get lots of information fast, and also to show how well the applicant can organize his thinking and express himself. "Suppose you tell me about your working experience, starting with your first job?" You may have to encourage the applicant to keep going by nodding approval or saying, "That's fine, tell me more," or the like.

7. Leading questions, that suggest a best answer—should never be used sympathetically to help the applicant, though they often are. For example, "This job involves a lot of detail; I suppose you like detail work?" The proper use of such questions is to check the applicant's suggestibility. Suggestible people are easily led and easy to work with. But they generally make poor supervisors.

8. Opinion questions—used to probe into emotional reactions and attitudes. The facts you're looking for are inside the applicant's mind. Is he strongly opinionated in his beliefs? Does he have a permanent grouch on? Is he unable to make up his mind?

9. Oral trade questions—used to test specific information that any skilled craftsman in a given trade should have. Right answers won't prove a man is skilled. But wrong answers clearly indicate he's falsifying or exaggerating.

10. "Thought questions"—used to probe an applicant's ability to think on his feet. They're not too commonly used, but they're very popular among men who do use them. Many start with "What would you do if," and go on to outline a problem. In a short interview, questions like this can be misleading. Unless you have time to get a good sampling of how your man thinks, it's well to take the results with a grain of salt.

8. KNOW WHAT TO LOOK FOR

Generally your aim in interviewing is to look for information on two main topics—the applicant's background and his characteristics.

From his background—his environment, memberships, and activities—you can get clues as to his habits and ambitions. These are important from the standpoint of long service with the company. If his pay is not enough to support him in the style to which he is accustomed, he's a doubtful risk.

What about his nationality and membership groups? They often suggest the kinds of people he will get along well with.

What about his family background? To some extent, this helps to indicate his probable level of achievement. After all, it's unusual to find a janitor in a family whose members are mostly doctors and lawyers.

Of course, background information must be followed up cautiously with specific questions. The fact that a man is Scotch, for example, isn't proof that he scrapes copper from his pennies!

To examine the characteristics of a man, it's helpful to break up your inquiries into five groups: (1) achievements; (2) aptitudes; (3) interests; (4) attitudes; and (5) physical condition.

Achievements are the things a man has done, including his training and education. Look back here even into the earlier years. A boy who makes model airplanes for sale, and sells them, at the age of 14, shows ability of a certain type just as much as he does on a job in later life.

Aptitudes are hard to spot in an interview. Ideally, psychological tests should reveal them. That's because they deal with what a man can do *potentially* rather than what he has actually done. Without tests, you can get clues to aptitudes in the light

of what the man has apparently done well in his personal or work history. Intelligence, for example, is a general aptitude for learning that is indicated to some extent by grades in schools, as well as by alertness to the immediate situation.

Interests add something to whatever information or impressions you have about aptitudes, since there is some relationship between what interests a person and what he can do well. Trouble is, the relationship isn't perfect by any means. So you have to do some guessing on this score.

Attitudes give you an idea of how mature he is, and how well adjusted he is emotionally. Negative attitudes are certainly helpful danger signs.

For example: Here's a man who doesn't like the city in which he lives. He despises his neighbors, ridicules the school system, and is convinced that justice is polluted with graft. You're probably making no mistake if you conclude he's the kind of man who will find just about everything wrong with his company and his fellow-workers.

Physical condition is more than age and sex, and often more than is usually reported as the result of a medical examination. Besides a man's defects, you want to know about his endurance and his vitality or "zip." You can get clues out of a man's habits and activities that will supplement the results of the medical examination. Is your man slow-moving, lethargic? Does he limit his activities to practically nothing more than moving from work to home? These are the simple things you want to inquire into.

9. BE A GOOD LISTENER

This point has already been mentioned in another connection. But here's a reminder that *not* being a good listener is one of the main weaknesses of inexperienced interviewers. They're so interested in their questions that they sometimes literally don't even know how the applicant answered.

Being a good listener is important, too, because some job-seekers can talk all around Robin Hood's barn without actually conveying much meaningful information about themselves. You have to be alert with such people to pick up the few really significant things they say.

For example, one applicant who was busily saying nothing in a lot of words, let this sentence slip out: "I sure didn't like Chicago; I had worse luck there than in Las Vegas."

The alert interviewer lost no time in following up his hunch with some cross-examination. He discovered he was talking to a confirmed gambler who had until then successfully concealed his record of unreliability.

Listening should also include looking. One thing to look for is typical dress or actions that indicate the applicant doesn't fit easily into his group. Never assume this to be true without exploring it with follow-up questions.

Jewelry, work calluses, and quality of clothing may indicate something of the applicant's economic status, too. Jerky movements, twitches, sudden loud laughter, all give clues to undue nervous tension. But remember: These are only clues. Keep an open mind till you've followed up, and found out why.

10. REASON YOUR WAY TO A DECISION

"Interviewing would be a cinch," a friend once told me, "if you didn't finally have to come to a definite *yes* or *no* conclusion, as a result."

Unfortunately, that's true. After you have accumulated a great mass of facts and impressions about an applicant, you have to put them together and make some sense out of them. That's where reasoning comes in.

The first thing to note is that, if you have been using an orderly interviewing method, there's no reason why your impressions should be confused. On each of the main points in your interviewing guide or checkchart a few big things will generally stand out. Some of these things will be *facts*. Others will be *inferences* that you have, consciously or unconsciously, drawn from those facts.

One of the main requirements of interviewing is to learn to distinguish sharply between the facts and the inferences. For example: Jones has had 10 years of experience as a machine operator. *That's a fact.* Jones's experience makes him a good prospect for a supervisory job. That's an inference.

To decide whether the fact justifies the inference requires constant alertness throughout the interview; demands that you keep trying to get additional facts that will help you decide *how good* the experience was, and how much Jones *actually learned* from it.

Here's a suggestion that may help you improve your skill in reasoning: When you've finished with your next interview, take about 10 minutes to do some writing. Write down first what seem to you to be the important facts about the candidate, being guided, of course, by the job requirements. Then, opposite each important fact, write down the inferences you draw from it as to the candidate's qualifications. As you get accustomed to this approach, you'll find it increasingly easy. And you'll find it makes your job easier, too, because you'll be picking better people.

TIPS TO GOOD HUMAN RELATIONS for factory executives

By M. J. MURPHY • Industrial Relations Editor

MORE ON GETTING WORKERS TO VOTE Wade Shurtleff, industrial relations director of The Standard Products Co., Cleveland, thinks you ought to know about another pamphlet to help get out the vote. It's aimed at telling your workers the *importance* of their votes, but not *how* to vote. The title, *Just One Vote,* gives a good analysis of how often one vote has swung critical issues. Really gets you stirred up. Source: Bureau of National Affairs, Inc., Washington 7, D. C.

HINTS ON INDUCTING NEW EXECUTIVES How many times have you ushered a newly hired executive into a barren office, with bare and empty desk? Or told him a place would be ready in a couple of days, as you apologetically stuck him off in some temporary corner? If you haven't any such experience to report, you're exceptional. It's all too common.

A friend, recently inducted into a job with the federal government, reports you can learn a lot from Uncle Sam on this score. Standard government practice is to set up every executive's office in line with a complete checklist of equipment. So, when the new man comes in he's fully prepared with all the things he needs to go right to work. He also knows exactly what kind of clerical or secretarial help he's entitled to.

The chap who reported on his experience has this to say: "I've moved jobs two or three times in industry, and have never seen anything to compare with what the government does. You ought to advise your readers that here's one case where they could imitate the bureaucrats with good results!"

PERSONNEL STATISTICS Here are some "yardstick answers" to two familiar and vexing questions: How big should a personnel department be? And how much is the top personnel executive worth?

The answers come from a survey made by Dale Yoder and Lenore P. N. Wilson of the University of Minnesota's Industrial Relations Center. The survey covers 782 plants, of which 74% are manufacturing plants, as reported in the July 1952 issue of American Management Association's magazine, *Personnel.* Some highlights of results:

1. Over-all, manufacturing plants had 0.63 personnel employees per 100 employees in the plant as a whole. That's one personnel worker per 158 employees.

2. The bigger the plant, the smaller the ratio. For example: Plants with less than 500 workers had a personnel ratio of 1.13 (1 to 89). Plants with 3000 or more workers had a ratio of 0.57 (1 to 176).

3. The bigger the plant, the bigger the top personnel man's salary. For plants with less

than 500 workers, the average salary was $6410, and for the over-3000 plants, the figure was $13,844.

4. The title "vice president in charge of personnel or industrial relations" has big money value. Survey shows it's worth $10,000 extra!

"BLIND FOR A DAY" ARTICLES ADVANCE EYE SAFETY

In these columns some time back, there was a brief tip on how a simple blindness test could stir up unprecedented supervisory reactions. Blindfolded only briefly for a discussion of eye safety, a group of foremen were so impressed they did the best safety job they had ever done.

Now a number of companies are using a variation of this basic idea for the benefit of all employees. Feature articles in employee magazines tell the story of how it feels to be blind for a day. The hero of each of these stories is an employee. Pictures and captions get the eye safety story across with a sharp, personal punch.

Three excellent examples are to be found in B. F. Goodrich's *Circle News* (June 2, 1952); Thompson Products *The Friendly Forum* (July 11, 1952); and Ford's *Cleveland Ford News* (June 1952).

It's easy to do, and it works. Why not try it?

THE HIGH COST OF ACCIDENTS

"You could work five days a week for the next million years, and not make up the time lost as a result of 1951's work accidents!" That's just one aspect of the fabulous economic loss we sustained last year from the 280-million man-days that accidents cost the nation. In dollars the cost was over $2½-billions!

Who said it? The National Safety Council, in its statistical annual—*Accident Facts*. The 1952 edition is just recently off the press. Worth having. Write to National Safety Council, 425 North Michigan Ave., Chicago 11, Ill. Single copies 75¢.

PUBLIC RELATIONS WHEN YOUR PLANT IS SHUT DOWN

More plants than ever, apparently, shut down for mass vacations last summer. That means more letters than ever went unanswered for two weeks or more. Could be an annoying public relations problem if not handled right.

Here's one simple solution—much appreciated at the receiving end: It's a 2-cent postcard, mimeographed, that came to a FACTORY editor in response to a letter he wrote in late July:

"We acknowledge receipt of your letter of 7/21/52. Our factory and office are closed for vacation and a reply will be sent to you as soon as possible after we reopen on August 4, 1952."

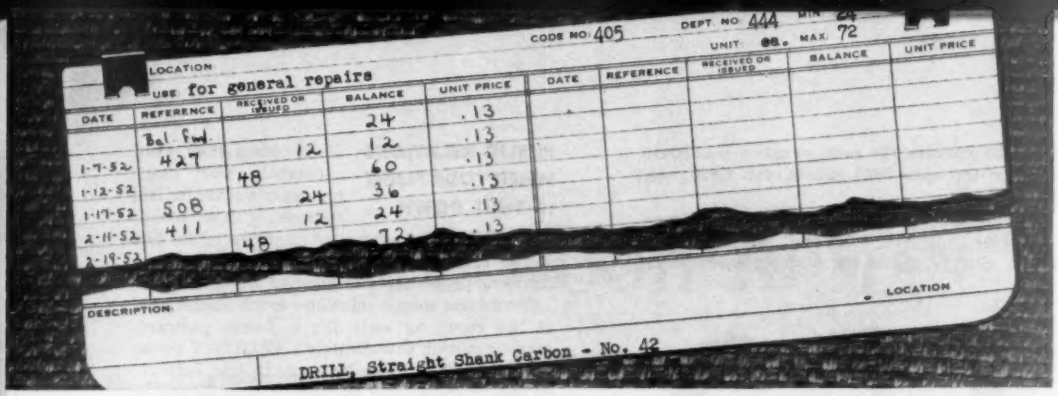
The company, Bridgeport Thermostat Division of Robertshaw-Fulton Controls Co., got an appreciative nod here. Their example's worth following next year in *your* plant.

HERE'S A WAY TO MASS-PRODUCE SAFETY MESSAGES

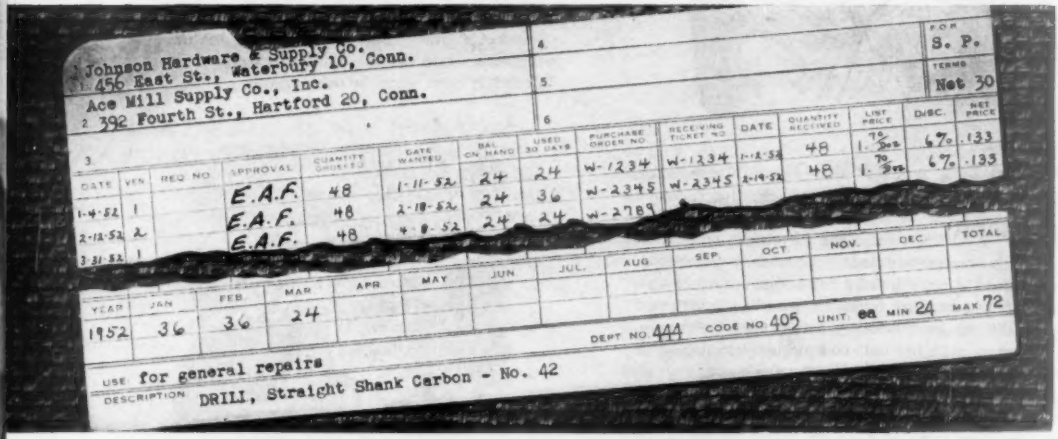
In most plants employees *see* lots of safety messages — signs, posters, etc. But they don't often *hear* any. Reason: It's been tough to rig up homemade equipment or adapt standard equipment to play recorded messages at the right time and in the right sequence.

Now here's a new machine called the Message Repeater, designed to make it easy to broadcast safety messages. It weighs only 6 pounds, is easy to operate. You talk your message onto plastic tape, play it at will. Announcements can be timed in any interval, up to five minutes. Or you can hook it to an electronic device so it's turned on as needed. Might be a good booster for your safety program. Source: Mohawk Business Machine Corp., 47 West St., New York.

CORRECTION: FACTORY put author Ralph R. Brown in the wrong city in the September issue ("Telling Employees Where They Stand," p. 126). Dr. Brown's company, United Industrial Services, is in Cincinnati.



INVENTORY CARD shows material received, issued, and balance left in stores. Typist fills in description of articles and use, maximum inventory limits. Amounts in and out are posted from withdrawal slips received in storeroom.


Johnson Hardware & Supply Co.
456 East St., Waterbury 10, Conn.
Ace Mill Supply Co., Inc.
392 Fourth St., Hartford 20, Conn.
F.O.B. S. P.
TERMS Net 30
USE for general repairs
DESCRIPTION DRILL, Straight Shank Carbon - No. 42
DEPT. NO. 444 CODE NO. 405 UNIT ea MIN 24 MAX 72

TRAVELING REQUISITION FORM is used to request purchases. Article description and use, names of vendors, and maximum and minimum inventory limits are typed in. Supervisor enters amounts on hand, ordered, and received, and rate of use.

Here's minimum paperwork for . . .

Effective Stores Control

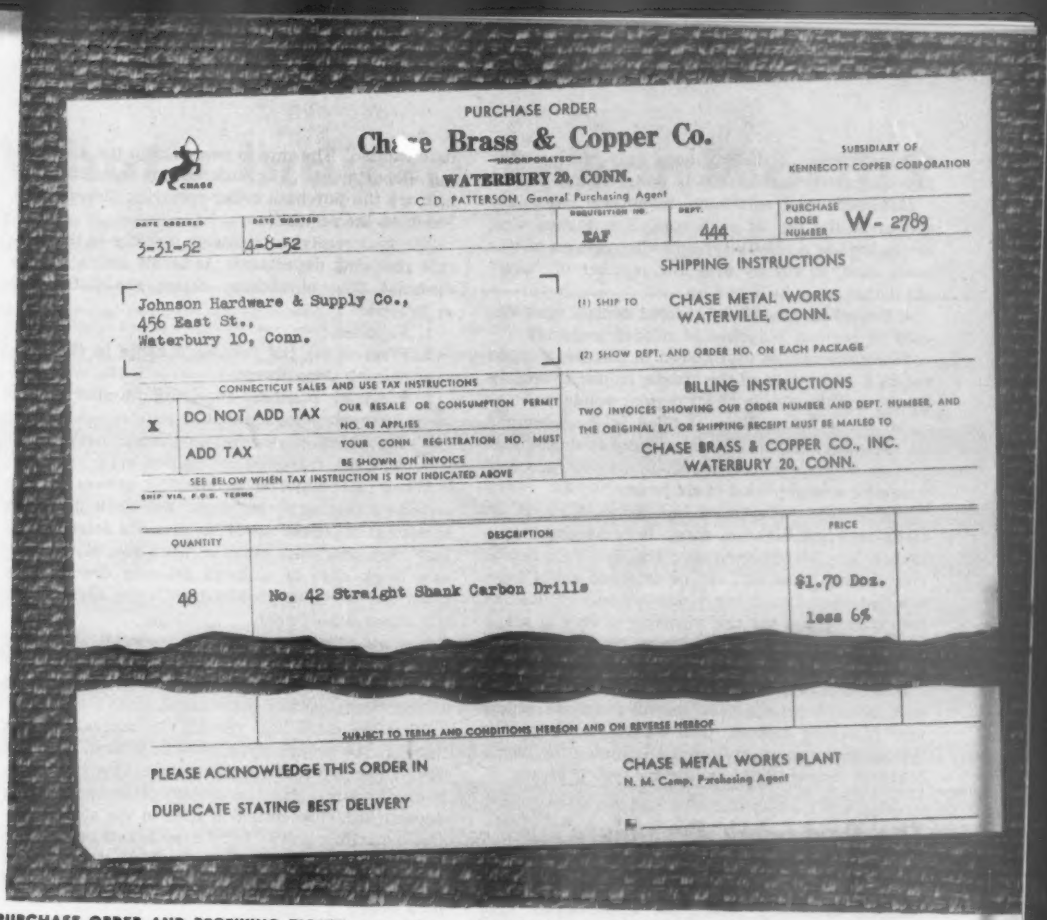
Setting up the physical facilities and organizing your personnel for control of maintenance stores is only half the job (June 1952, page 140). Now author Boutin tells how to finish the job, with a paperwork procedure that eliminates red tape and cuts the clerical load to a minimum.

By GILBERT R. BOUTIN • Plant Controller
Chase Brass & Copper Co., Inc., Waterbury, Conn.

ARE YOU "STILL LOOKING" for a way to get maximum stores control with a minimum of paperwork?

We were, until not too long ago. But we think we have the answer now. It's simple enough and flexible enough so that you may be able to adapt it to a similar problem.

Of course, to make any paperwork plan effective, your stores control system must be based on sound principles. (To see how ours is set up, look at FACTORY, June 1952, page 140.) Within that framework, we have established a simple, 3-form system for keeping records.



PURCHASE ORDER

Chase Brass & Copper Co.
INCORPORATED
WATERBURY 20, CONN.
C. D. PATTERSON, General Purchasing Agent

SUBSIDIARY OF
KENNECOTT COPPER CORPORATION

DATE ORDERED	DATE WANTED	REQUISITION NO.	DEPT.	PURCHASE ORDER NUMBER
3-31-52	4-8-52	EAF	444	W- 2789

Johnson Hardware & Supply Co.,
456 East St.,
Waterbury 10, Conn.

SHIPPING INSTRUCTIONS

(1) SHIP TO CHASE METAL WORKS
WATERVILLE, CONN.

(2) SHOW DEPT. AND ORDER NO. ON EACH PACKAGE

CONNECTICUT SALES AND USE TAX INSTRUCTIONS

X DO NOT ADD TAX — OUR RESALE OR CONSUMPTION PERMIT NO. 43 APPLIES

ADD TAX — YOUR CONN. REGISTRATION NO. MUST BE SHOWN ON INVOICE

SEE BELOW WHEN TAX INSTRUCTION IS NOT INDICATED ABOVE

BILLING INSTRUCTIONS

TWO INVOICES SHOWING OUR ORDER NUMBER AND DEPT. NUMBER, AND THE ORIGINAL B/L OR SHIPPING RECEIPT MUST BE MAILED TO
CHASE BRASS & COPPER CO., INC.
WATERBURY 20, CONN.

SHIP VIA, F.O.B. TERMS

QUANTITY	DESCRIPTION	PRICE
48	No. 42 Straight Shank Carbon Drills	$1.70 Doz. less 6%

SUBJECT TO TERMS AND CONDITIONS HEREON AND ON REVERSE HEREOF

PLEASE ACKNOWLEDGE THIS ORDER IN DUPLICATE STATING BEST DELIVERY

CHASE METAL WORKS PLANT
N. M. Camp, Purchasing Agent
By _____

PURCHASE ORDER AND RECEIVING TICKET are a carbon combination, cutting typing 50%. The purchasing set of copies (first four) can easily be detached from the receiving copies (last four). Price is illegible on the receiving copies.

Approaching the Problem

We started by using the work simplification "question" approach—Can we eliminate, combine, change, or simplify? Where work simplification has not been applied previously—and that's often the case with paperwork—you may find it worth while to put unusual effort on possible eliminations.

In doing that, we asked these three questions about every step in our paperwork procedure:

1. Is this step necessary?
2. How much does it accomplish?
3. What would happen if it were eliminated?

When you get the answers to those questions, you may be in for a shock. But you'll also be in a good position to act fast to cut a lot of unneeded paperwork—with a big saving in both labor and paper cost. There's also a good chance you'll improve the general efficiency of your supervisors, because it's just as much of an interruption for a supervisor to sign an unneeded form as to sign a really essential one.

Our present paperwork system here at Chase Brass & Copper Company, Inc., has reduced clerical labor to a minimum. Yet we have not sacrificed a bit of our tight control over maintenance stores. If anything, our control is tighter.

Our Three Forms

Before we look at the paperwork procedure, let's make a quick run-down of the forms we use:

• **Inventory card.** This is our "in-and-out" card. Stores control uses it to record movement of material. It is posted from the withdrawal slip received in the storeroom.

If you have more than one storeroom, duplicates of the withdrawal slips can be sent to stores con-

trol for posting. Since we have only one maintenance storeroom, this step is unnecessary.

Maximum and minimum inventory limits are shown at the top of each card. For fast-moving items, we use a saddle-type overlay version of this same card, to cut by 67% the number of "new" cards that must be typed up.

• **Traveling requisition.** Stores control uses this card to request purchase of needed material.

When the card is first placed in the file, a typist enters a description of the article, its use, inventory limits, and the names of all regular vendors.

All other information is filled in by longhand by the stores supervisor. A section at the bottom of each side provides a month-by-month record of usage for a total period of six years.

• **Purchase order-receiving ticket.** This is an eight-copy combination form. It is designed as a carbon-interleaved snap-out. The first four copies (purchasing order set) can be detached easily from the last four (receiving ticket copies). Price information typed on the purchase orders is made illegible on the receiving copies by an ingenious "numbers scramble."

Since it was necessary to repeat all the information (except price) on both the purchase orders and receiving tickets, this combination cut our typing load almost 50%, and eliminated the possibility of discrepancies caused by typing errors.

The Paperwork Procedure

Our cycle of paperwork starts the moment the running inventory record for a particular item shows the stock has dropped to the minimum limit.

At this point, the stores control clerk pulls the traveling requisition out of the file. He enters the amount on hand and the last 30-days' usage. The supervisor then determines the amount needed and date wanted. The card is next sent to the purchasing department. The information necessary to prepare the purchase order-receiving ticket is already on the requisition.

The four receiving copies go directly to the outside receiving department, to await arrival of the material. The purchasing copies are distributed as follows:

1. Supplier.
2. Filed under the supplier's name in the purchasing department.
3. Filed by purchase-receiving number in the purchasing department.
4. Sent back to the stores control department with the traveling requisition card.

When the material eventually arrives in the outside receiving department, the clerk pulls the receiving ticket set out of his files. He detaches the last copy and holds it in an open file, along with any truck slips or railroad delivery checks. The other three copies go along with the material to the stores department.

The storekeeper checks the material as he receives it and enters the amount received on the receiving form. He then forwards the three copies to the stores control department.

Here the clerk first records the arrival of each item on the proper stock inventory card. Then he distributes the receiving ticket set. One copy goes to the accounts payable section of the accounting department. The second is filed in the stores control department. The third copy is returned to the outside receiving department, where it is relayed to the traffic department for analysis of the shipping costs.

Of course, no clerical system—no matter how efficient—can ever substitute for alert, efficient stores personnel. But simplified paperwork will do a lot towards making their daily efforts more effective and less costly.

Look among the advertising pages each month for...

. . . **Important New Catalogs.** They're free. They're easy to get. Just check the coupon. Mail it to us. We do the rest. **Page 153.**

. . . **What's New in Equipment.** A quick-reading summary of the latest plant equipment. Featured this month: a flexible valve shield to cut hazardous spray from steam and acid lines. **Page 168.**

. . . **Significant Labor Relations.** Will an arbitrator uphold the firing of a Communist? Here's the story of one case—and pointers on many other labor problems. **Page 236.**

. . . **You Mustn't Miss.** Practice what you teach in work simplification classroom . . . From billet to crankshaft automatically . . . Latest in big forging presses . . . Concentration rather than dispersal in new GE plant. And other items. **Page 300.**

. . . **PEP and POP.** Suggestions on ways to solve Plant Engineering Problems, **Page 262,** and Plant Operating Problems, **Page 266.**

. . . **Books and Booklets.** One of the important books for plant engineers: *Industrial Waste Treatment*, Edmund B. Besselievre. **Page 340.**

What's Indirect Labor Worth?

Here are figures for 10 more cities, compiled by the Bureau of Labor Statistics, U. S. Labor Department. They supplement figures for 30 other cities (FACTORY, July, p. 126; Aug., p. 91).

● All figures are average straight-time earnings in manufacturing industries except figures in light-face type, which are for *all* industries. They include incentive pay, if any. But they do *not* include overtime or night-shift premium.

Surveys were not all made at the same time. Date of each survey is shown under the city name.

		ALBANY MARCH 1952	ALLENTOWN MAY 1952	ATLANTA MARCH 1952	BIRMINGHAM APRIL 1952	BOSTON APRIL 1952	CHICAGO MARCH 1952	COLUMBUS APRIL 1952	JACKSONVILLE MAY 1952	LOUISVILLE MAY 1952	PHOENIX MARCH 1952
	MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN	AVERAGE STRAIGHT TIME HOURLY EARNINGS									
Maintenance and Power Plant Jobs	Carpenters, maintenance	$1.84	$1.73	$1.70	$1.79	$1.79	$1.94	$1.81	$1.51	$1.97	$1.89
	Electricians, maintenance	1.94	1.70	1.94	1.89	1.92	2.09	1.87	1.96	2.08	–
	Engineers, stationary	1.87	1.85	1.54	1.71	1.92	2.12	1.86	1.53	2.04	1.93
	Firemen, stationary boiler	1.57	1.36	1.23	1.16	1.59	1.63	1.48	1.21	1.59	–
	Helpers, trades	1.57	1.47	1.27	–	1.56	1.62	1.47	1.36	1.48	1.42
	Machinists, maintenance	1.88	–	1.82	1.88	1.88	2.08	1.91	1.75	1.97	–
	Mechanics, automotive (maintenance)	1.70	1.83	1.65	1.70	1.86	2.03	1.74	1.59	1.82	1.79
	Mechanics, maintenance	1.86	1.69	1.60	1.74	1.75	1.95	1.72	1.82	1.96	1.82
	Millwrights	1.92	1.72	–	1.86	1.78	1.99	1.86	1.66	2.01	–
	Oilers	1.52	1.50	1.19	1.35	1.43	1.63	1.52	1.11	1.61	1.44
	Painters, maintenance	1.76	1.71	1.75	1.70	1.73	1.93	1.75	1.86	1.96	1.80
	Pipe fitters, maintenance	2.00	1.79	1.91	–	1.86	2.04	1.92	–	2.10	–
	Sheet-metal workers, maintenance	–	1.77	2.06	1.80	1.84	2.01	1.80	1.91	2.01	–
	Tool and die makers (other than job shops)	2.09	1.96	–	1.87	2.02	2.29	2.21	–	2.15	–
Custodial, Warehousing, and Shipping Jobs	Crane operators, bridge (under 20 tons)	–	1.56	1.52	1.52	1.68	1.67	1.55	1.49	1.67	–
	Guards	–	–	1.54	1.36	1.46	1.53	1.46	1.18	1.60	1.45
	Janitors, porters, and cleaners	1.35	1.20	1.05	1.07	1.26	1.36	1.19	.94	1.26	1.19
	Janitors, porters, and cleaners (female)	1.08	.93	.85	.88	1.14	1.26	1.09	.49	1.12	1.00
	Order fillers	1.41	1.39	1.23	1.08	1.47	1.67	1.40	1.02	1.36	1.24
	Packers	1.40	1.11	1.06	1.46	1.37	1.44	1.38	.92	1.35	1.28
	Packers (female)	1.01	1.07	.97	–	1.32	1.19	1.10	.80	.99	–
	Shipping clerks	1.52	1.50	1.22	1.67	1.50	1.69	1.57	1.44	1.47	1.53
	Shipping and receiving clerks	1.41	1.45	1.41	1.47	1.42	1.66	1.45	1.49	1.62	1.28
	Stock handlers and truckers, hand	1.34	1.31	.95	1.20	1.38	1.45	1.41	.89	1.22	1.32
	Truck drivers, light (under 1½ tons)	1.49	1.37	.99	1.18	1.74	1.99	1.41	1.13	1.52	1.44
	Truck drivers, medium (1½ to 4 tons)	1.55	1.42	1.02	1.25	1.63	2.02	1.51	1.01	1.41	1.34
	Truckers, power (fork lift)	1.52	1.50	1.35	1.46	1.57	1.62	1.52	1.00	1.49	1.49
	Truckers, power (other than fork lift)	–	1.56	1.54	1.23	1.61	1.61	1.51	1.00	1.68	–
	Watchmen	1.27	1.17	1.03	1.22	1.23	1.31	1.25	1.00	1.08	1.05
	FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN	AVERAGE STRAIGHT TIME WEEKLY EARNINGS									
Office, Professional and Technical Jobs	Comptometer operators	53.00	46.50	49.50	49.50	47.00	55.50	50.50	48.00	49.50	48.00
	Draftsmen (male)	–	80.50	77.00	80.00	83.50	82.50	79.00	76.50	83.50	74.00
	Draftsmen, junior (male)	–	62.50	60.00	57.50	60.50	63.50	70.50	–	59.50	62.00
	Duplicating-machine operators	48.50	–	44.00	47.00	44.50	46.50	44.50	–	41.00	37.50
	Key-punch operators	52.00	45.00	52.50	50.50	45.00	53.00	52.00	36.00	51.00	–
	Nurses (registered)	63.00	57.50	63.00	62.00	60.00	65.00	60.00	56.00	61.00	–
	Office girls	43.50	34.00	38.00	39.00	40.00	42.00	39.00	34.00	40.00	35.50
	Payroll clerks	53.50	44.00	55.00	53.50	49.00	57.50	49.00	46.50	51.00	51.50
	Secretaries	61.50	55.00	60.00	59.50	58.50	66.50	61.00	54.50	59.50	53.00
	Stenographers, general	53.00	47.00	53.50	51.50	49.50	56.50	52.00	46.50	49.00	47.00
	Typists, class A	51.50	46.00	49.50	45.50	48.50	55.00	52.00	42.00	52.00	45.00
	Typists, class B	49.50	38.50	42.50	43.00	42.50	48.00	45.50	37.50	42.00	40.50

Is Off-the-Job Safety Any of Your Business?

It sure is. And it's *good* business, too.

Plugging off-the-job safety can shave your group insurance premiums by 35% to 40%. And you'll probably find off-the-job accidents cause far more absenteeism than on-the-job mishaps—in one plant 10 times as many.

Here's the story of *why* off-the-job safety should be your business, and *how* you can do something about it without spending a lot of money.

Why bother?

A punchpress operator in a New England plant lost the second and third fingers of her left hand. The only apparent reason for the accident was that she "wasn't paying attention." Investigation revealed that her husband had been injured in an auto accident two years earlier, and as a result was developing into a mental case. On being questioned, the injured woman reported: "All I know is, I was thinking about my husband at home. The next thing I knew, my left hand was caught in the press."

Tragedies like this happen too often. And they point up one reason why off-the-job safety is *your* business and *good* business:

Off-job accidents have serious emotional effects on workers that make them less safe and less productive on the job.

There are three other reasons for "bothering" with off-the-job safety:

1. There are many more off-the-job than on-the-job accidents annually. The ratio is almost 2 to 1: 30,000 off-the-job deaths, 16,000 on-the-job deaths among people of working age; and 3.5-million disabling injuries off-the-job to 2.1-million on-the-job.

In the light of these figures, there's no doubt that off-the-job accidents are a big problem. And, when individual plants begin to study their own experience, the problem looms even bigger. For example:

"In Akron plant operations covering 6 years and over 196-million factory man-hours, we have had no industrial fatalities. In the same 6 years, 22 employees were killed in off-the-job accidents—18 of these in traffic! Further checking disclosed that 7 of these off-the-job fatalities were skilled workers, 7 others were semi-skilled."

(The B. F. Goodrich Company).

"From records of occupational and non-occupational accidents for the past 5 years, we have found that for every plant accident our employees have sustained 2½ to 3½ off-the-job accidents."

(The Bakelite Company)

If *your* plant's experience is similar to that cited above, you already have one powerful reason for getting stirred up about off-job safety.

2. Off-the-job accidents are a major cause of absenteeism. And absenteeism costs money—about $56 per employee per year, according to figures compiled by the Insurance Economics Survey, based on a study of 249 representative companies in all sections of the country.

There are no national statistics on just how much absenteeism can be attributed to off-the-job accidents. But you won't find authorities arguing with you if you conclude that such accidents cause considerably more absenteeism than on-the-job accidents. It's the only logical conclusion, since off-the-job accidents are almost twice as frequent.

But here's another case where you may find your own plant experience shows a far worse picture than you'd expect from national figures. Here's an example of what one company, employing about 3000 people, discovered:

In 1951, the plant analyzed its group accident and health insurance claims, and found that off-

the-job accidents caused 1044 days of absenteeism.

In this same period, only 98½ days were lost because of on-the-job accidents! And the figures are even more impressive when you consider that the company counted only those off-the-job accidents that involved *more than 14 days* of absence. There were no reliable records of shorter periods of lost time.

In this case, the company can rightly conclude that off-the-job accidents are *at least* 10 times more important than on-the-job accidents as a cause of absenteeism.

3. Control of off-job accidents can yield important savings of insurance premiums. Here the picture is about the same as for on-the-job accidents, where managements for years have worked to reduce workmen's compensation insurance rates by in-plant accident prevention work. In such cases, it's not uncommon to achieve compensation insurance rate credits of 35% to 40% by sound, effective in-plant safety programs.

In most cases, the same cost-reducing benefits can be achieved on group insurance premiums, which cover off-the-job accidents.

Don't forget that, on the average, group insurance premiums run higher than workmen's compensation costs. That means there's at least as much money—if not more—to be saved through an off-job safety program as through an on-the-job program. If you add to this the savings you can probably get through reduced absenteeism, the dollars-and-cents benefits shape up as big money, worth working for.

Looking ahead, there's another point to be considered, too. It's possible that some time in the future group insurance may have the same compulsory status, nationally, that workmen's compensation has now.

What's wrong?

Here's a big question that many plant operating executives are probably asking themselves by this time: If off-the-job safety is as important as all this, then why haven't more companies done more about it? What's the catch?

There are at least three "catches," as shown in a recent survey:

1. Many executives are worried that employees and their families might resent an off-the-job safety program. It's touchy business, they feel, quite different from running in-plant safety programs. Workers might feel management was butting into their private lives.

2. There's also a pretty general feeling that the off-the-job safety problem is too "intangible." Literally thousands of things can happen to workers in countless places once they leave the plant. Even if they didn't scatter to the four winds, it would still be an almost impossible job to control their actions.

3. What specific steps can you take to improve off-the-job safety, and how can you measure the results? In effect, these questioners are asking for a definite program, with well-defined, tested procedures to use as a working tool—or as a model after which to pattern their own programs.

American Mutual Liability Insurance Company finds these three objections have apparently been powerful enough to block actions by most executives. A survey of company practices shows that only one plant in three has done anything at all about off-the-job safety. And there is very little evidence that *any* fully organized programs are being conducted among the companies surveyed.

Is the situation hopeless? By no means, respond the companies that were asked. Seven out of eight say they'd *like* to do something about off-the-job safety—if they could get their hands on a practical plan, and if it didn't take too much time from work or arouse employee resentment.

What are the "ground rules" for a practical program?

If you want to make off-the-job safety programs work, you need to get off to the right start. And to do that, these seven ground rules need to be well understood and acted on:

1. Your program must have strong management support. As in most other activities, you get poor results just giving lip service to off-job safety.

2. Responsibility for the program must be clearly assigned. If it's everybody's job, nobody will do it. Maybe you want off-job safety integrated with in-plant programs. If so, your safety director or personnel director is the man. Or maybe you prefer a committee system. Doesn't matter—if you make it clear that whoever gets the job is definitely responsible for sparking it along.

3. You must keep at it. Continuity is the key to success. Casual, sporadic efforts don't work.

4. Your program must be *interesting*. Sounds silly to say this. But don't forget that safety is essentially dull. Only accidents make the front page. So dreaming up ways to liven up your program is part of your job.

5. The program must be practical and specific. Just telling people not to get hurt is a waste of breath. You need lots of know-how and show-how, and active participation by workers.

6. The program should have plenty of family appeal. You can't confine yourself just to those who come into the plant every day. Off-the-job safety consciousness must percolate into the home, too.

7. You have to have facts about off-the-job accidents. This is a tough requirement, but essential. The least you need is a simple procedure to investigate and report on off-job accidents.

For highlights of a practical off-the-job safety program, turn the page.

Begins on page 146

ACCIDENT REPORTS are key to off-job safety programs. Personnel department clerk above fills out special, simplified report form for employee who has strained arm muscles in home accident. Lack of such data has been great weakness.

OFF-JOB SAFETY POSTERS should hit workers' attention just as they leave the plant, as in this picture. Time clocks, gate houses, bus stations are good spots. Posters have limited value used alone, must be tied in with over-all safety program.

Here Are the Highlights of a Practical Program

There's obviously no one best way to run an off-the-job safety program. But here's a nine-point program that should give you an idea of what's involved. It's the kind of program you could adopt tomorrow pretty much "as is." Or you could merely use it as a model on which to pattern something more directly tailor-made for your plant.

Some plants are already using elements of this program, and a few are starting to use it in full. Estimates of what it costs vary, but limited experience to date suggests you'll have to spend about $1 per family per year.

You will see that the program calls for prepared materials of various kinds. Most of the materials in one form or another are readily available from National Safety Council, and a number of casualty insurance companies, both stock and mutual. First step, certainly, is to check with your own insurance company. As outlined in program form below, the materials are all available from American Mutual Liability Insurance Company. This company emphasizes that you need not be a policy-holder to secure the materials. The program:

1. Write a kick-off letter to each employee's family. Purpose is to explain just what you plan to do, and to "sell" the family group on the importance to them personally of the off-the-job safety program. This also gives the program "official" standing, assures everybody that management is serious about the whole thing.

2. Hold a big kick-off family safety meeting. There are lots of ways to do this. One highly popular method is invite workers and families to come to an audience-participation quiz program to be held in some suitable community meeting place. Such programs have been held by a number of companies, using a special script prepared by American Mutual. The script is set up just like a regular radio script, and a few plants have arranged to broadcast the proceedings over local radio stations. You can make your own script, of course, too. But remember to concentrate solely on home and traffic safety. All kinds of information is available from National Safety Council and other interested organizations. Such meetings really get your program off to a big, well-publicized start. And they get participation, which is a big advantage.

3. Provide each family with home safety check charts. The aim is to help the family to eliminate unsafe conditions in and about the home. Charts of this type can be obtained at small cost.

4. Provide each family periodically with pamphlets and bulletins on specific ways to make the home a safer place to live in. Materials like these are readily obtainable, and often include suggestions on how to handle emergencies, first aid information, and health ideas that have family appeal. Booklets of this type should be distributed at least twice a year.

5. Provide families with special reports on spe-

HOME SAFETY CHECKCHARTS are a great help in getting family participation in off-the-job safety programs. Here employee and wife are making systematic survey of whole house called for by checkchart provided by company.

RADIO-STYLE QUIZ SHOW like this will help get any off-job safety program off to a flying start. This show was attended by nearly 1000 people (mainly employees of local plants and their families) in Worcester, Mass.

to Promote Off-the-Job Safety

cific hazards. These can be interspersed among the more general items mentioned above. They can also be made more effective by selecting items that have seasonal timeliness. Spring is a good time for a booklet on safe use of ladders, for example. And as the fall heating season begins, a booklet on home fire prevention would be timely.

6. Maintain good coverage of in-plant bulletin boards with posters that emphasize off-job safety. Used to supplement other safety activities, posters have considerable value in giving you a well-rounded program.

7. Let your employee magazine or newspaper help your program, too. Publications of this type generally enjoy good family readership in the home. Some, in fact, are mailed to employees' homes. Articles about the progress of the over-all program are in order, as are specific suggestions that supplement or tie in with booklets and pamphlets that you have been sending out to families. Many organizations interested in safety provide special materials designed for use by plant magazine editors. These are often provided free of charge or at nominal cost.

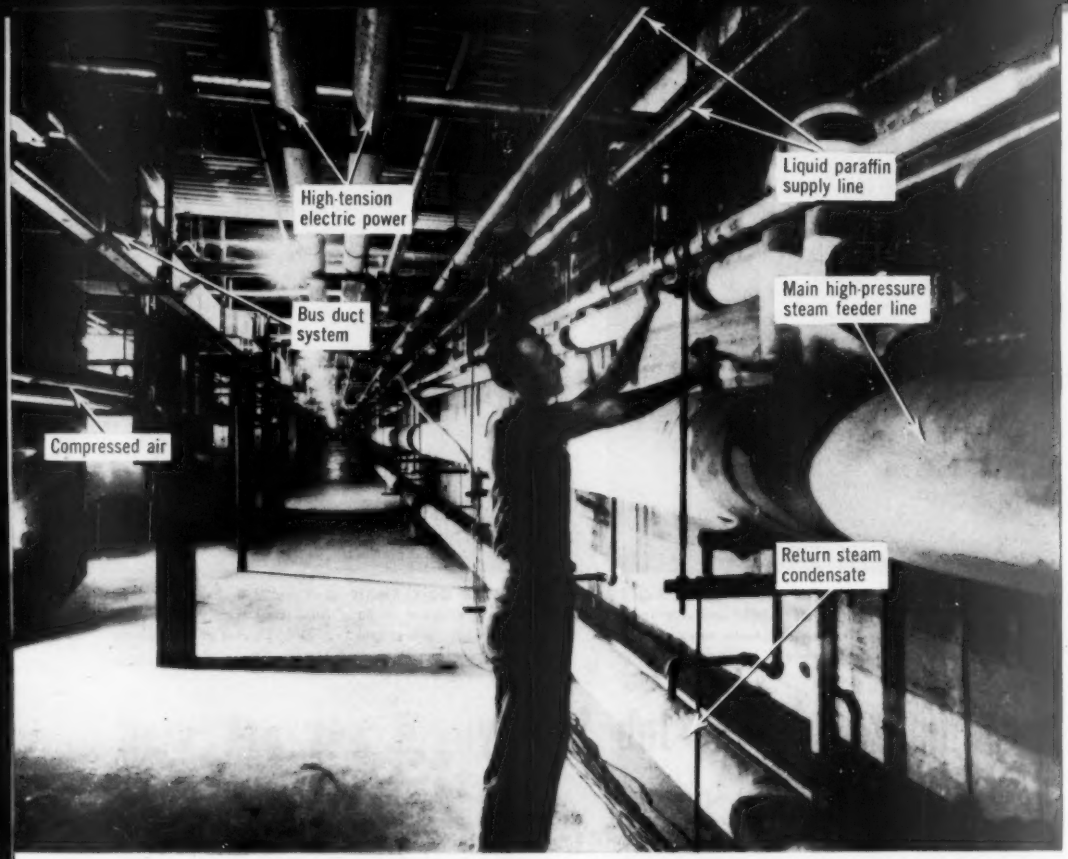
8. Build some incentives into your program. For example, set up competition among groups in the plant, with prizes or other forms of recognition for the best off-job safety records. To bring the family more directly into the picture, you might also follow the lead of some other companies and set up a scholarship essay contest for children of employees. A good subject is, "What we have done to make our home safer." There are any number of incentive possibilities—just as many as in on-the-job safety.

9. Develop a simple plan for investigating and reporting off-the-job accidents. This is a *must.* You can't report the program's progress and you can't build up competition or interest if you can't tell people the statistical picture. Surprisingly, experience of a few plants indicates that getting reports on off-job accidents isn't nearly as tough a problem as you might think. A good, easy-to-fill-out accident report form is the first requirement. That's available. American Mutual has a good one, and so do other organizations.

Then you need a simple system for getting forms filled out and recorded. The method will vary with your own local needs. One common system is to tie the record-keeping right in with your present system for on-the-job injuries.

For employees themselves, there is, of course, no real problem. You know when they are absent, and generally find it easy to discover why.

For the families, it's naturally harder to get full co-operation. That's the reason for the various techniques previously discussed; only by developing interest and cooperation over a period of time can you expect to get the full participation needed to make a program of off-the-job safety effective.



TUNNELS under the manufacturing area prove Lily-Tulip people had maintenance on their minds when they planned their new plant at Springfield, Mo. No services hanging from the ceiling meant lightweight, low-cost building construction.

New plant for Lily Cup was . . .

Planned for Ease of Maintenance

THIS ISN'T THE FIRST PLANT planned for "ease of maintenance." Nor do we say that item headed the list of specifications for Lily-Tulip Cup Corporation's new plant at Springfield, Mo. But the photograph above is about all the evidence we need that ease of maintenance was very much on somebody's mind.

The "somebody" was Harlan L. Carroll. He's vice president in charge of manufacturing—and supervised the building of the new plant. The architects were **Hurley & Hughes,** New York; the builders, P. Kretzer & Son, Inc., Flushing, N. Y.

Photograph shows the Lily-Tulip system of . . .

TUNNELS • The new plant was built around the idea that no services should be taken to the machines from overhead. That meant lightweight, low-cost construction, as well as economical service installation costs. And it also guarantees ease of maintenance at correspondingly low cost.

The tunnels run under the entire manufacturing floor. And they provide ample space for steam, steam condensate, hot and cold water, gas vacuum, compressed air, liquid paraffin, and electrical services. They are 9 feet high. And they vary in width from 5 feet to 14 feet, depending on the number of services they are required to carry.

NEW PLANT for Lily-Tulip Cup Corporation sets on 100 acres of land. Plenty of room for employee parking. Plenty of room for future growth. Controlled temperature and humidity make it a first-class plant for both products and people.

Of course, there are other things about this new plant that make it not only easy to maintain, but an outstanding plant from other angles. For example, its . . .

EXTERIOR WALLS • They're of cavity construction, which is relatively new in industrial plant construction. The outer face is of brick, the inner of structural tile. Between the two is a 1-in. air space, which provides a moisture barrier and materially reduces heat transmission. Should cut Lily-Tulip's fuel bill plenty. So will the . . .

ROOF • A 1-in. layer of glass fiber was set into a framework of sub-purlin tee bars. Next a layer of re-inforcing wire. Then gypsum and lightweight aggregate in a plastic state were pumped into place.

The waterproofing course is built-up pitch and gravel.

An "April showers" roof spray system was installed to maintain a film of water on the roof during sunlight hours. This system is completely auto-

ROOF SPRAY keeps roof temperatures down, takes a big load off the air conditioning system, saves fuel dollars.

matic. It keeps the roof temperature right around 95 degrees in hot weather, instead of nearer 150 degrees. The result is a decrease in roof maintenance and an increase in roof life—as well as additional fire protection. And, of course, required refrigeration capacity is cut by about 250 tons. Which gets us around to . . .

AIR CONDITIONING · To insure peak efficiency of both machines and employees, as well as close control of product quality, the manufacturing areas are maintained at uniform temperature and humidity the year around.

Equipment for temperature and humidity control consists of a water cooling tower and pumps to supply cooling water for the condensers on nine freon compressors, each with a capacity of 100 tons of refrigeration. Ultimate plant capacity provided for is 1100 tons.

In the freon heat exchangers, where chilled water is produced, the temperature of the water is lowered. The chilled water is pumped to the cooling coils in the air conditioning units.

In addition to the air conditioning units on each floor and in the I.B.M. room of the office building, there are six units on mezzanines throughout the manufacturing area. The largest unit circulates 70,000 cfm. and the smallest 3000 cfm.

Each unit has its own fresh air and return air supply; permanent type washable filters; preheat, reheat and cooling coils; moisture eliminators; drain pens; fans, motors, and drives; and temperature controls. Manufacturing units have water circulating pumps and heat exchangers for humidity control.

In the summer, temperature and humidity are maintained by cooling coils, steam reheat coils and fresh air. In the winter, control is maintained by the amount of fresh air, steam preheat and reheat, water circulating pumps and heat exchangers. Control of the conditions to be maintained is effected by a Powers pneumatic air control system.

FIRE AREAS · The entire plant is divided into six fire areas. Masonry fire walls 12 inches thick divide the areas. The plant is equipped with a sprinkler system of 4511 heads, as well as hose carts and portable extinguishers of several types.

An 8-in. cast-iron underground loop supplies the 18 separate sprinkler systems and many outside hydrants. In addition to the city water supply, there is a secondary system, consisting of a 100,000-gal. water storage tank, erected on a 100-ft. tower, situated at the southeast corner of the property.

LIGHTING · Rows of overhead lighting ducts are set on 15-ft. centers throughout the building. This means a fixture may be moved at a moment's notice to another location. A fused twist plug attached to the fixture is inserted into the duct.

A continuous row of fixtures may be hung over an area where more intense lighting is necessary. And, in storage areas, fixtures may be removed for economy. To hold the fixture in alignment and also to support the lighting duct, 28,000 feet of ⅜-in. 7-strand suspension cable was installed with ⅜-in. hanger rods suspended from the joists on 15-ft. centers.

To insure the perfect balance of the lighting load on the load centers, the lighting duct was tapped in the center of each area with a 6x4-in. wireway across the building in each area. This wireway terminates in a lighting panel set in the center of the building.

LOADING FACILITIES · Railway cars and motor trucks can be loaded or unloaded inside the building, providing complete protection from weather hazards to raw materials or finished products. Operations continue uninterrupted on the 550-ft. interior railroad siding and at the interior truckport, which can accommodate 10 trucks at a time.

KITCHEN AND CAFETERIA · Modern in every respect, both kitchen and cafeteria were designed with emphasis on paper service. The kitchen is equipped for all kinds of baking and cooking. Both kitchen and cafeteria have sanitary tile walls and floors. Most of the equipment and furnishings are made of stainless steel. Two serving areas are provided, one for sandwiches and the other for prepared meals. Seating capacity of the plant cafeteria is 212.

RESTROOMS · Sanitary facilities consist of 12 toilet rooms, conveniently located near working areas to keep time loss at a minimum. Sanitation and economical maintenance were given paramount consideration in the construction of restrooms. Walls and floors are ceramic material and none of the fixtures rests on the floor. This facilitates cleaning. Locker rooms for employees contain 1450 lockers. Two lounges are provided for women employees.

PARKING · At present, the shipping area yard is being used for parking. This will be sufficient until near-ultimate capacity is reached. Space is provided east of the building for a future parking lot to accommodate 800 cars.

FENCE · A 7-ft. Cyclone fence 3300 feet long abuts the north and south ends of the building and marks the perimeter of the property lying east of the plant.

LANDSCAPING · In landscaping the 21-acre grounds, 1450 pounds of seed, 1200 pounds of lime, and 9000 pounds of fertilizer were used to produce the lawns. More than 100 shrubs, plants, and trees had been set at the time of the building's dedication. This will be increased to 13,000 when the landscaping is completed.

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ELECTRICAL EQUIPMENT

1 Wires & Cables

An 186-page catalog describes more than 500 different types of wires and cables. Comprehensive data on construction and operating characteristics for control and signal, telephone, and other applications. Catalog No. W-52-3. United States Rubber Co.

2 Bus Ducts

This 4-page bulletin (No. 750) describes maker's new type of bus duct using aluminum connectors. Also gives charts to show relative performance of aluminum and copper in bus duct. Bulldog Electrical Products Co.

3 Polyphase Induction Motors

Large wound-rotor and squirrel-cage polyphase induction motors are subjects of this 6-page folder. There are features, advantages, and design details for each type. Bulletin No. 37-200. The Electric Products Co.

4 Variable Speed Motor Drives

In this 16-page catalog are illustrations, specifications, and technical data on variable speed motor drives of from 1/3 to 7½ hp. Describes belt change, gives tips on operation. Selection information. Catalog No. AS-1600-B6. Worthington Corp.

5 Motor Speed Controls

Features, descriptions, and applications of 4 models of motor speed controls are highlights of this 8-page bulletin. Included are specifications, dimensions, and sample installation drawings. Also information on cost, maintenance. Form No. 792-A. General Radio Co.

6 Gear Motors

Bulletin No. F-1650 gives you the story on maker's low-speed, right-angle, worm-gear motor. Cut-away drawings, design features, specifications, and illustrations. Tells how it works, how you service it, and describes available models. U. S. Electrical Motors Inc.

7 Wiring Devices

Here's an 8-page folder on operation and advantages of interlocking wiring devices. Shows how the units can eliminate accidental disconnects, describes construction details and typical installations throughout industry. Complete dimensions. Arrow-Hart & Hegeman Electric Co.

DUPLICATE COUPON ON PAGE 260

MAIL THIS COUPON FOR FREE CATALOGS *(Good until Dec. 31, 1952)*

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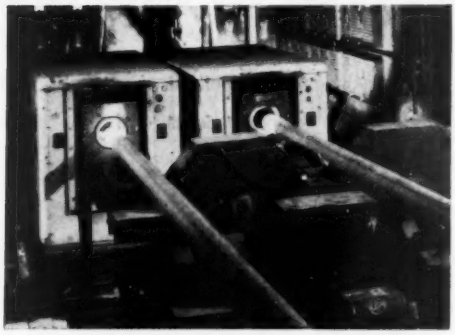
JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor



INDUCTION HEATING UNITS move onto the pipe.

• HERE'S AN IDEA: HEATERS MAY BE EASIER TO MOVE THAN PRODUCT

I saw an unusual installation of induction heating while visiting the Ambridge (Pa.) plant of Spang-Chalfant Division, National Supply Company.

In one operation in making drill piping, it's necessary to heat the end of the pipe for a length of 10 inches to a forging temperature of 2200 F. The job's a natural for high-frequency induction-heating units. They can bring cold pipe to nearly white-hot forging temperature in about one minute. But it would be a tough job to push the long, heavy lengths of pipe into the small and relatively delicate coil of the induction unit.

So the Spang-Chalfant people decided to push the induction units onto the work. They are much smaller and can be positioned on the pipes with great accuracy.

The photograph shows how they did the job. The cabinets containing the coils move forward and backward, lengthwise of the pipe.

As they move forward, the induction coils slide the correct distance over the pipes. Power is then turned on and the sections of pipe inside the coils are heated. The first coil (right) heats the cold pipe to 1700 F. The second step takes the end thus preheated and brings it to 2200 F.

When the desired temperatures are reached, power is shut off, and the cabinets move back off the pipe. The lengths of pipe move sideways in the materials handling equipment—from right to left. This brings a cold pipe to the preheat coil, transfers the preheated pipe to the high-heat coil, and starts the pipe from the high-heat coil on its way to the upsetting machine, the next step in the process. All these operations are automatically controlled.

By using two cabinets to do the heating in two steps, Spang-Chalfant needs only one piece of handling equipment. And production steps up to the rate of one pipe every 30 seconds—instead of one every minute, which would be the rate if only one cabinet were used.

• WATCH OUT FOR TROUBLE FROM PORTABLE CORDS

Portable electric cords take a beating in any plant. Trucks run over them. Oil and greases soften the rubber. Wires are pulled out of cable grips. Splices are made by mechanics who haven't the slightest idea how to make a splice—they just twist the wires together and wrap a piece of tape around the joint.

Wire guards and protective glass globes are removed and lost when your men replace lamps on the cords. Then they bend a piece of cardboard around a lamp bulb to act as a shade. A fine way to start a fire!

Or the glass globe gets dirty with grease or paint, so the workman throws it away. Next, your men take cords with bare lamp bulbs into tanks that may contain explosive gases. The portable lamp breaks and *bang* goes the tank—and the men.

Another dangerous stunt of electricians: They go down into manholes without explosion-proof portable lights. How about getting some for your maintenance department? (And that means flashlights, too.) The men are liable to meet up with all sorts of gases in a manhole. One spark and they're headed for the promised land.

Educate your maintenance mechanics on the above dangers and how to prevent the hazards from portable cords. Also, make sure your electricians check all portable cords regularly and tag them with the date of inspection. You'll save lives and property from explosions and fires.

• CHECK YOUR INSULATORS WHILE WEATHER'S STILL GOOD

Did you have the high-voltage insulators in your outdoor substations cleaned this summer? If not, better check up on them before cold weather really sets in.

Here's why: Dust and fumes from your plant—

or your neighbor's—may have deposited a layer of dirt on these insulators. (Acid fumes or copper dust are especially bad.) During the winter, snow and rain often coat them with ice. Then, when the weather warms up a little, water from the melting ice may mix with the dirt to provide the necessary "bridge" to ground for the high voltage to "flash over." Off goes the power and your plant closes down.

One chemical plant in the Midwest had a rough night last winter. Insulators began "flashing over" all over their 13,200-volt outdoor substations and pole lines. In a matter of seconds the whole plant was shut down. The complete power outage resulted not only in large losses to products in process but also in serious damage to equipment and buildings from a fire that followed the failure of the power.

So the thing to do—now while the weather is still good—is to plan shutdowns of your substations so that the insulators can be wiped clean or washed with a cleaning agent. It may be necessary to scrub the porcelain in some cases.

While the gang is cleaning insulators is also a good time to look over the rest of the switchgear in the yard. Clean and grease your disconnect switches and their operating mechanisms. Check and tighten up all holding bolts on the steel structures. Touch up those rust spots on the steel work of the switchgear.

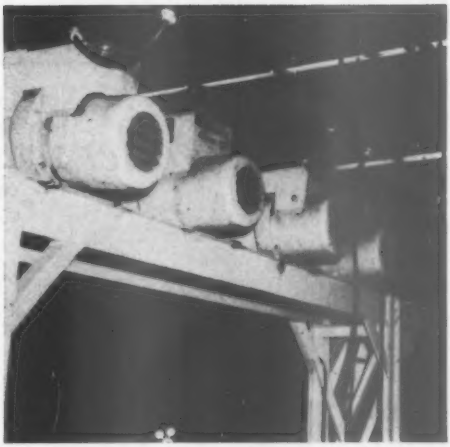
And oil those hinges on the entrance gates (you may have to get into the switchyard in a hurry one of these days; a gate with "frozen" hinges may take up precious minutes to open).

• NEW ANSWER TO HIGH-BAY LIGHTING MAINTENANCE

I saw a foundry in Detroit that's using the new mercury lamps with built-in reflectors. The lamps are 400-watt size. The maintenance electricians told me these lamps are really going to save them the headaches of cleaning fixtures every three weeks. When I saw the lamps were 30 feet off the floor, I agreed. These reflector-type lamps have been up for four months with no signs of dirt on the face of the lamps.

A 400-WATT MERCURY LAMP, built-in reflector.

For high bays with hard-to-reach lamps, reflector lamps, whether incandescent or mercury, will help reduce lamp maintenance costs—and bring smiles to the faces of your maintenance electricians.



WELDERS HELD HIGH on racks save floor space.

• HOW TO KEEP ARC WELDERS OUT OF HARM'S WAY

The Cleveland Tank Plant operated by GM's Cadillac Division uses a lot of arc welders. These welders have been put on racks above the working areas.

The Cadillac men tell me they get four advantages from the elevated racks:

1. The welders are out of most of the shop dirt.
2. Cooling is better.
3. Operators can't tinker with the settings.
4. Valuable floor area is saved.

• CAN YOU KEEP YOUR VOLTAGE RIGHT ON THE BUTTON?

You hear a lot these days about voltage control in industrial plants. The introduction of all sorts of electronic controls that are critical to voltage makes it doubly important that you keep your voltage in the plant right on the button.

But how much sense does it make to worry about voltage drop in the wiring of your plant distribution system when the power coming into your plant can vary plus or minus 5%? Or maybe even more. In some states, the power commission that regulates public utilities permits them to supply power at 10% over or under normal voltage.

Ten per cent of 480 volts is 48 volts. It would take a pretty big voltage drop to equal that amount of variation.

Before you load yourself up with a lot of control equipment that requires close voltage control in your plant in order to operate, you'd better check your incoming voltage and take steps to get voltage regulators for those control circuits that need it.

The Reader AUDITED PAID ABC CIRCULATION *His Mark*

THE ABC SYMBOL which is printed at the head of this page is, in a very real sense, *your* brand on this magazine. Those letters stand for Audit Bureau of Circulations. The symbol indicates that the magazine is a member and supporter of that Bureau.

To the advertiser who contemplates using the magazine as an advertising medium, this symbol has a well-recognized significance. It tells him that the circulation records and practices of the magazine are wide open to the auditors of the Bureau, who check the publisher's claims and make public the precise terms and conditions under which subscriptions are obtained. And it assures him that the magazine stays in business by virtue of a demonstrated demand from its readers as shown by their paid subscriptions or newsstand purchases.

BUT HERE we are concerned only with the significance of ABC to you as a reader. For when the advertisers, the advertising agencies, and the publishers founded the Bureau nearly forty years ago to help establish honest circulation figures, they unwittingly set up a cooperative institution that has become a major safeguard for the interests of the reading public.

That is because membership in ABC constitutes one of the strongest guarantees that any publication can offer of its primary devotion to the interests of its readers. And by making that guarantee possible, ABC becomes a major safeguard of the freedom of the press, an objective of exceptional importance in these days when the public is flooded with propaganda from so many sources.

THE SUREST MEANS by which to preserve a free press is to keep it directly answerable to the reading public it would serve. It follows, then, that the survival of a truly free press must depend on its acceptance by that public; and that means in turn that the people must have in their hands some adequate means for holding the publishers responsible to them.

No one has yet devised any means to that end more simple, more direct or more practical than the paid subscription or newsstand purchase price. The right to purchase or refrain from purchasing a publication gives to the readers and to no one else the power to pass judgment on whether that publication should continue to serve the reading public.

TO SUPERVISE this vital process, to check and certify the integrity of the publication's circulation methods and claims, requires a strict and continuing audit of each publication's success in meeting this test of its public acceptance. To that essential function the ABC has contributed mightily by the conscientious performance of its mission. And that is why we are able to have a press supported, for the most part, by advertising revenues, but not controlled as to its circulation or content by any influence other than its readers.

When an advertiser consults the ABC statement of a publication to ascertain the amount, the quality and the trend of its circulation, he does so in the legitimate pursuit of his own interest. But at the same time, inevitably, he is helping the ABC to keep the press responsible and responsive to the reading public. For, in effect, he is asking the publication to demonstrate through its circulation figures that it owes its standing to a voluntary demand by its readers.

SO THE Audit Bureau of Circulations, by auditing and certifying paid circulations, has come to perform a vital service to the readers of this magazine and of every other member publication. And in performing that service, it helps to maintain in our country a press that is answerable to the reading public and to it alone. So long as the practices and principles for which ABC stands continue to prevail in American publishing, we shall find in it a sure support for a truly free press, responsible only to the public it serves.

McGraw-Hill Publishing Company

Remington Rand Methods News

How to get better maintenance from smaller inventory

There's a firm of 2,000 employees operating on a total maintenance inventory of only $30,000 *which turns over at the rate of nine times a year.* What's more, they don't have to worry about running short of any part or material needed to keep the machines running.

This achievement was made possible by centralizing the inventory records and the purchasing of maintenance supplies under a control system which Remington Rand designed and installed.

Previously, individual department heads had done much of their own buying. This led to wasteful duplication of stocks. Likewise, they passed up the valuable savings of volume buying because each plant bought from its own sources. Nor could they get the service which comes with planned buying.

Previously, an entire department might be shut down for lack of a single part in the stock room when it was needed. Now the stocks cannot fall below a safe minimum on any item without management knowing about it.

Reducing the total stock has also reduced the stockroom space for maintenance items. And the stockroom clerks have less paperwork to do. Let us show you how such a system can work for small plants or large. Ask for our new methods file **MC-802.**

SENIORITY SO YOU CAN SEE IT. A good way to prevent or settle disputes is this visible list of employees by seniority rating. Can be kept up to date for years without retyping. Names can be inserted or removed without disturbing sequence. Lists by trade or department can also be displayed publicly on your plant bulletin boards. See details in our manual X-521.

FASTEST KNOWN WAY TO PRODUCE YOUR PAYCHECKS. Let us show you a new Stub-Check payroll system which pays for itself in savings on check forms alone; also eliminates many clerical work steps. This plan not only helps you meet payroll deadlines with less confusion — it also simplifies your entire payroll operation. Just ask for folder AB-569.

How a plant got back on schedule by coordinating its control procedures

In this case, the production facilities were ready when the sales mushroomed as expected. Things went fine for a year or so. Then, suddenly, the orders were backing up in the shop. Some machines would have a big backlog of work while others were idle.

Was the problem simply one of poor machine loading? Or had the whole control system been outgrown? After talking it over, the plant executives decided to call Remington Rand for an outside viewpoint and professional counsel on the entire production control system.

A preliminary study by our management engineers showed the problem went much deeper than machine-load scheduling. So our engineers were authorized to dig to the bottom of the problem.

In their final report, these engineers proposed simple ways to get complete, accurate control over all phases of production – including materials, tools and inspections. New forms and methods were developed to simplify the work on operation sheets, and other factory paper. Flow charts showed how to correlate the flow of work between production, engineering, purchasing and sales.

When these recommendations were put into effect, the plant ran like a different place. No more snarls in machine loading. They got back on schedule – and stayed there. In fact, sales doubled again in the next three years and the control system continued to process a growing volume with the same smooth-working efficiency.

Let us give you the case history of this plant and its experience with simplified control methods. Ask for folder **SN-724.**

Remington Rand

Management Controls Reference Library
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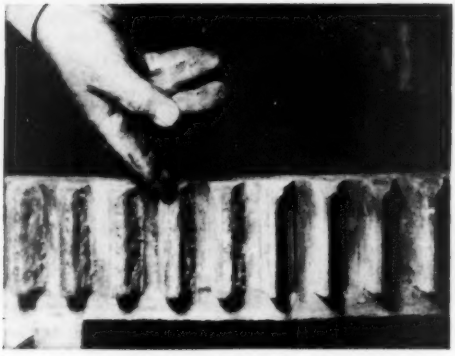
MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor, FACTORY



BUILT-UP TEETH in a ring gear show how . . .

. . . You Can Repair Worn Cast Iron Machine Parts

The worn teeth in the right half of this photograph state the problem. This was the condition of all 184 teeth of an 8-ft. cast iron ring gear on a beet washer in a food packing plant. It was just before a busy Fall season. The gear couldn't last but a few weeks.

Best delivery of a new gear was nine months. Shutdown seemed inescapable. There was one chance left—repair of the gear by building up each tooth with a hard welded overlay.

But that method had its "ifs," too. It wasn't possible to remove the gear from the machine without a big loss in time. This meant that no preheating, except locally, was possible. Yet the overlay had to be strong and wear-resistant. Therefore shape of the overlay had to be controlled to keep the time-consuming job of hand finishing each tooth to a minimum.

Maintenance welders got busy with a rod, Eutectrode 24, which is suitable for "cold" application on cast iron. Oil and grease were previously removed by solvent cleaning. The teeth were then seared with an oxidizing flame from an oxy-acetylene torch to reduce free carbon.

An initial layer was applied in short passes. Every move was aimed to prevent distortion, warping, or embrittlement through overheating. Welders worked on sections of five teeth at a time. The left half of the photograph shows how the teeth were finally built up, before they were hand finished.

The repair was more than successful. The overlay actually made the old gear a better product than a new one. The company saved itself a shutdown and over $1000 to boot. A new gear would have cost $1400. Labor, material, and overhead for the repair cost less than $400.

Changed Maintenance Philosophy May Lead to Higher Output

This title appeared on a recent tip from Basic Refractories, Inc., describing a new maintenance approach by the copper industry. Because it illustrates a challenging principle, we go for it. For it shows that some men are looking at maintenance costs as they should, namely in their relationship to over-all cost of production.

In case you don't know it, maintenance of copper melting and refining furnaces is quite a problem. Life of sidewall lining of a casting furnace, for example, runs about five months. Then you are in for an expensive re-bricking job. And if you don't re-brick, you're sticking your neck out for more costly repairs later on.

Somebody got to thinking it might be cheaper to maintain the linings of a copper furnace by a continuous patching program. At the first sign of erosion, fix it up. Thus you could keep eroded sections from being ruined. The steel industry was using a special gun and refractory this way. Why couldn't copper?

Here's a good reason why not. The granular refractories needed in this technique are expensive. More expensive than the basic brick. This makes actual maintenance costs higher.

To many maintenance executives, that fact would have squelched what seemed like a good idea. But not to the man with broad vision. For the continuous patching program, it seems, actually can be easier on the company pocketbook because it stretches out the furnace life to as much as 2½ years. So you have fewer shutdowns for repairs and tonnage output is therefore higher. In short, you save more than you lose.

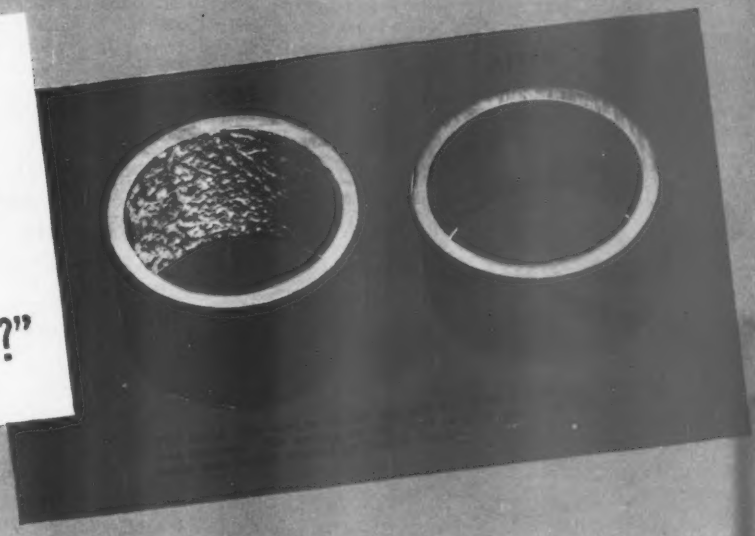
Here's a good example of two principles FACTORY has been hammering at for years. You can often justify spending more money for maintenance, Mr. Plant Manager, by the net saving in unit

DOWELL SERVICE

CHEMISTRY APPLIED TO MAINTENANCE CLEANING PROBLEMS

A Utility asked:

"Can you help us get our boiler cleaner?"



Dowell Service removed 1,650 lbs. of deposits left after turbining

Dowell was recently called upon to clean a 150,000 pphr. boiler. In a few hours, 1,650 lbs. of deposits were removed even though the boiler had been previously cleaned by turbining!

If you have a cleaning job to be done on boilers or heat exchange equipment, look to Dowell Service. Special liquid solvents are applied according to the technique demanded by the job—filling, spraying, jetting, cascading or vaporizing. No scaffolding or dismantling is necessary—costly downtime is held to a minimum.

Dowell Service is used to clean many different types of equipment—condensers, process towers, pipe lines, storage tanks, boilers, heat exchangers, evaporators, tanks and water wells. Dowell furnishes all necessary trained personnel, chemicals, pump trucks and controls.

Dowell engineers have experience in all kinds of cleaning problems. And Dowell equipment is designed to help them do the best possible job. Call the office or station nearest you for complete information and estimates. No obligation, of course.

Other recent Dowell jobs:

6 black liquor evaporators in a paper mill were cleaned by Dowell Service. The result was a 25% more efficient use of steam.

•

2 fuel oil heaters were cleaned by Dowell Service for a sugar company. Pressure drop was reduced from 60 p.s.i. to 30 p.s.i. and temperature was increased by 40° F.

•

3 heat exchangers in a refinery were cleaned by Dowell Service. After cleaning, one unit could carry the load previously carried by all three.

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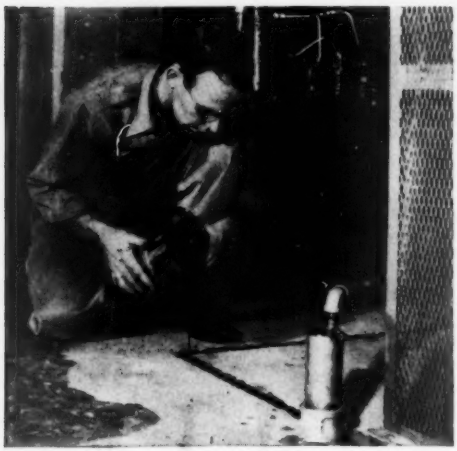
cost of product. And don't limit your calculations strictly to maintenance savings, Mr. Maintenance Executive, when you try to prove in new methods or equipment. Be sure to take a broad look at what makes money in any plant—higher output.



EASY USE of neoprene sealer suggests . . .

. . . How to Cure Those Troublesome Floor Joints

RECENTLY the DuPont Company installed a 40-hp. horizontal air compressor in the basement of its big office building in Wilmington, Del.

To minimize noise and vibration, it mounted the compressor on a separate concrete block. This block—8½ feet long, 3 feet wide, and 3 feet thick—in turn rested on the ground. A space 1 in. wide separated the block from a 6-in.-thick concrete floor slab all around. This space was filled to within a half inch of the top with a strip of cork. All fairly conventional design, you'll agree.

The problem now was to find a calking compound to fill the rest of the crack. An asphaltic compound used heretofore on similar jobs wasn't working out so well. It would squeeze out, get on shoes, and get tacky in warm weather. Needed too much maintenance.

A liquid neoprene sealer made for calking purposes by one of several manufacturers, was tried. It is applied as a liquid. But after the solvent evaporates it becomes tough and rubbery You stir in a few ounces of a vulcanization accelerator just before use to promote the cure.

In this case the cork bottom and concrete sides of the groove were brushed with one coat of primer to get a good bond. The groove was filled in flush to the floor in four stages, to allow the solvent to escape between pourings.

DuPont says this sealer is working fine. It isn't affected by hot weather, sunlight, or oxidation. It doesn't dry out, get hard and brittle in cold weather, but retains its flexibility. Oil, gasoline, or common floor cleaner, don't affect it. Looks as though the problem of a good seal for cracks or joints is licked.

2 Hours to Get at a Part, 20 Minutes to Repair It

Machines in the factory of the future are becoming more compact. That's as it should be. But there's a danger compactness will often be gained at the sacrifice of accessibility of parts and accessory equipment.

We already have this situation today. A maintenance craftsman spends hours to get at equipment, and only minutes to fix it. Maintenance labor costs are multiplied. But what is worse, so is machine downtime.

This can't exist in the factory of the future. When one such delay can hold up an entire production line, everybody—machine manufacturers and users—will have to get together in creating equipment that is easy and safe to service.

With some thought, it can be done. The J. I. C. (Joint Industry Conference) standards are helping to bring sanity into design. Take, for example, a machine tool with hydraulic controls. Have you seen some of them, with the pump and solenoid valves tucked neatly away in the gizzards? Looks as though the machine tool was built on top and around them. These parts are well protected and out of the way, all right, but your maintenance man has to be a midget and a contortionist to get at them.

Now see how simply the machine tool of the future houses this same equipment. It mounts the pump with its drive motor and solenoid valves on a platform with casters. You can wheel the whole assembly into the base of the machine.

In case of trouble or for routine maintenance, it takes two minutes to disconnect the hydraulic hoses and pull out the pump assembly. It's in the open, ready to work on, or to replace quickly with a spare unit.

• • •

► **To lubricate moving contact shoes** on an automatic plating machine, Lasalco, Inc., of St. Louis uses "Dag" colloidal graphite. Reasons it gives are (1) it's a good solid lubricant, and (2) it has excellent electrical conductivity.

Turn to page 262 for good ways to solve special plant engineering problems

MEASURE THESE VALUES WHEN YOU BUY METERS

Accuracy·Capacity·Compactness

Part of an installation of nine R-C Positive Displacement Meters in large chemical plant. Capacities from 3,000 cfh to 130,000 cfh.

Industrial buyers rate R-C Positive Displacement Meters "tops" in these basic essentials.

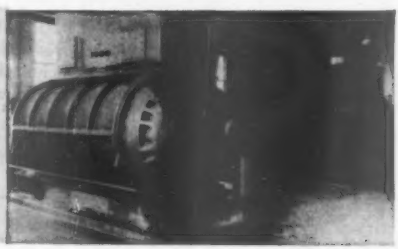
Accuracy—Not affected by pressure, wide variations in loads or other variables. Simple design, with no vanes, valves or small parts, results in maintained accuracy over long years of operation.

Capacity—from 4,000 cfh to 1,000,000 cfh in one unit, to meet practically any industrial metering requirements. Ample ability to absorb overloads.

Compactness—foot for foot of capacity, R-C Meters are the smallest made for industrial use. Can be "tucked away" in relatively small space without loss of valuable production area.

These values have long been proved by large and small industrial plants and public utilities. More R-C Meters are used by gas producing plants, for their own manufacturing and for commercial customers, than any other make. For details on sizes and construction, ask for Bulletin 40-B-14.

ROOTS-CONNERSVILLE BLOWER CORPORATION
524 Central Avenue, Connersville, Indiana



Three large R-C Meters in public utility plant. Unit in foreground has capacity of 1,000,000 cfh.

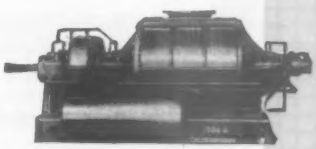
ROOTS-CONNERSVILLE BLOWER
A DIVISION OF DRESSER INDUSTRIES, INC.

THE *DUAL-ABILITY* LINE OF MODERN EQUIPMENT TO HANDLE GAS AND AIR

Multi-Stage Centrifugal Exhausters

Single-Stage Centrifugal Blowers

Rotary Positive Blowers



Rotary Positive Gas Pumps

Positive Displacement Meters

Inert Gas Generators

maintenance data sheet 192

Prepared by John J. Phillips, Chief Engineer, Titeflex, Inc., Newark, N. J.

How to Avoid Failure in Flexible Metallic Hose

If your metallic hose fails repeatedly at any one machine or location, or if you aren't getting good service from it, take a look at the installation.

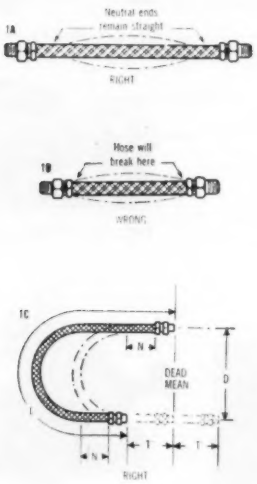
Usually the hose manufacturer helps you choose the best material and design for the service conditions. But you can defeat this careful selection when you fail to install according to simple rules.

Here are three basic precautions that promise you longest service with lowest maintenance cost:
1. Don't stress metallic hose beyond its elastic limit. To do so causes failure from metal fatigue.
2. Don't bend hose closer than the minimum radius specified by the manufacturer. To do so will induce strain or fatigue on the extended grooves at the outside bend radius. Or it will create compression distortion on the hose convolutions at the inside bend radius. Either case results in early failure.
3. Don't twist metal hose. Torque of any kind causes excessive strain at both the groove and convolution radii centers. Try to remember that metallic hose has a bellows action; it is bendable only in one plane at a time.

MINIMIZE BENDS OR STRAINS

Poor physical arrangement of the hose connections is a prime fault of installation. You will do well to study each installation to see which set-up creates the right conditions for normal flexing.

The following six rules show, with diagrams, the right and wrong ways to install metallic hose. Check your own installations against them.



1. BE SURE HOSE IS LONG ENOUGH

Provide enough length to avoid sharp bends or undue strains at fittings. See that hose has a "neutral" length "N" at each end of about 5 times its I.D. (Figure 1A, straight-connected hose; and Figure 1C, loop connection).

Too short a hose in proportion to diameter (Figure 1B) will put extra strain on hose near coupling if there is any vibration. Correct length (Figure 1A) permits vibrations to taper off to a straight line before ends of coupling are reached.

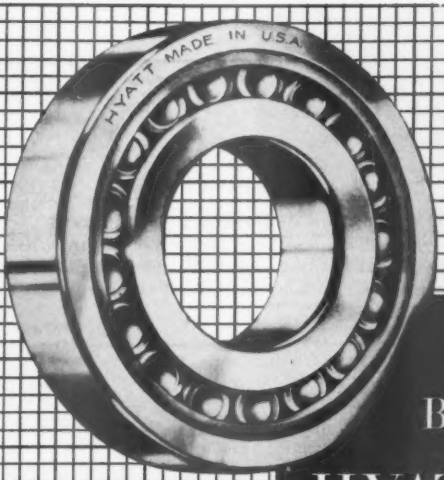
For hose having no travel you can determine the minimum bending distance "D" (Figure 1C) and right over-all length direct from manufacturers' tables for any given hose diameter. In general, the minimum bending distance varies from 40 times the I.D. for ¼-in. hose to 16 times the I.D. for 2-in. hose. Check with the manufacturer.

When the hose is subject to travel, be sure to add to the above length the amount of greatest travel from the dead mean position, as shown by T', or T" in Figure 1C. Don't forget: The over-all length you order is interpreted as a measurement "L" from face to face of fittings (Figure 1C).

2. INSTALL HOSE WITH FITTINGS PARALLEL

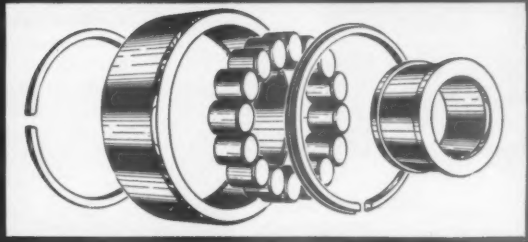
You avoid undue strain and twisting by making sure that hose flexes in one plane only (Figure 2).

Turn the page



For Maximum
Bearing Capacity

HYATT HY-LOADS



THERE are ten major types of Hyatt Hy-Loads—the high capacity cylindrical roller bearings for radial or light or intermittent thrust loads.

Four of the ten Hy-Loads have separable inner races, two have separable outer races and four are non-separable. Made in two diameter series, wide and narrow widths, to standard boundary dimensions, they permit wide flexibility in machine design and assembly procedures.

Typical of the Hyatt-Hy-Load line, the U-TM bearing, one of the non-separable types is illustrated and shows its full complement of rollers for maximum bearing load-carrying capacity.

And all other types, too, are just as correct in their design and equally precision-built for the kind of dependable bearing performance you expect from Hyatt equipped machines. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

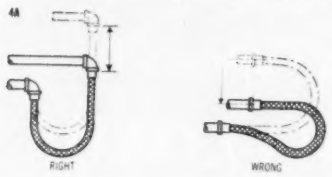
maintenance data sheet **193**

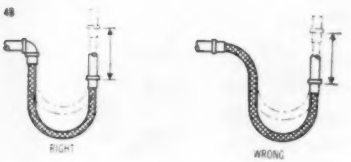
HOW TO AVOID FAILURE IN METALLIC HOSE . . .

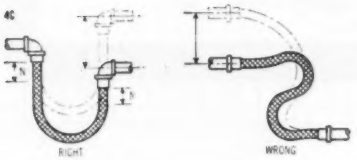
Begins on page 162

3. KEEP MOTION OF HOSE IN A SINGLE PLANE

This plane should run throughout length of hose. Continual twisting of hose outside this plane will cause early fatigue and failure (Figure 3).

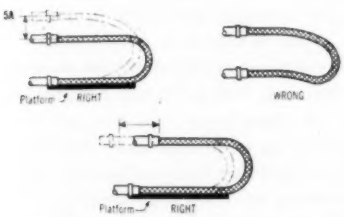






4. AVOID SHORT RADII AND S-BENDS

Use longer pipe and 90-deg. connections to avoid bad set-ups, such as a short radius (Figure 4A), a double bend (Figure 4B), an S-bend (Figure 4C). In some cases, on the other hand, it is better to substitute straight connections for 90-deg. connections (Figure 4 D).



5. SUPPORT HOSE SECURELY

Long runs of hose that flex continually near fittings because of machine movement or vibration need support to prevent failure at those points (Figure 5A).

Be sure a support does not cause sharp bends in the hanging hose (Figure 5C).

Support long runs of hose by straps to prevent wire-braid creep caused by gravity and vibration. Where chafing is possible, use chafing guards made of rubber, leather, or similar material.

Don't make the hose support its own weight by the wrong up-and-over arrangement of Figure 5B (below).

Turn the page

MINNEAPOLIS
Sept. 29, through Oct. 1.

MILWAUKEE
Oct. 7, through Oct. 10.

ST. LOUIS
Sept. 23, through Sept. 26.

BUFFALO
Oct. 29, through Oct. 31.

NEW HAVEN
Nov. 11, through Nov. 13.

BALTIMORE
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INDUSTRIAL MARKETING (June 1952)

"NEXT TO THE GREATEST SHOW ON EARTH . . . We could go on . . . reciting the fantastic properties of Silicones, but just as breathtaking as the materials were the display techniques used to demonstrate them . . ."
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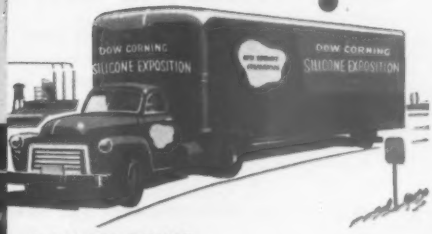
POWER ENGINEERING (May 1952)



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They learned that silicones are fluids and resins that keep clothes and shoes and brick walls dry in the rain. They're fluids that polish without rubbing.

They're rubber that won't melt on hot aircraft engine cylinders or freeze on switches that operate bomb bay doors at 100° below zero.

They're electrical insulating resins and varnishes that double the power of electric motors, or multiply by 10 the life of electric machines.

They're paints that protect metal at 1000°F. They're foam killers and release agents. They're a whole family of new engineering materials that can help you to improve your product or to cut production costs.

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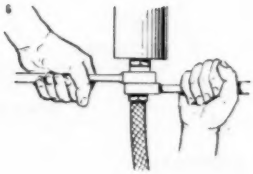
HOW TO AVOID FAILURE IN METALLIC HOSE . . . *Begins on page 162*



6. DON'T TWIST OR COMPRESS THE HOSE

Twisting of hose causes supporting braid strands to deform and break at fitting. Lacking this re-inforcement, the hose will fail early. Twisting happens mostly during the installation of a hose that has a union connection at one end. You can avoid it by using two wrenches, one to hold the hose in place, as shown in Figure 6.

OTHER INSTALLATION HINTS

1. AVOID PHYSICAL DAMAGE TO THE HOSE

Never stretch it beyond its elastic limit. If vibration exists, provide enough slack to absorb all vibration strains in the bellows movement. Long lines of hose can be coiled but take care they do not kink or you'll get undue wear of the inner core.

2. DON'T ALLOW HOSE TO CARRY ANY LOAD

Hose is designed only for internal flow loads. All pulling or stress resisting should be left to connecting parts. In one case, mechanics were using metal hose as a climbing aid. This is abuse!

When hose connects moving elements, see that the strain is taken up by the supports.

3. DESIGN HYDRAULIC APPLICATIONS WITH CARE

Watch out for high surge pressures in hydraulic set-ups. Ordinary flexible metallic hose cannot endure the continuous flexing caused by high surge pressures. Special design is needed.

Be sure to select the proper size to carry the expected flow. An oversize hose is inefficient. Too small a hose will cause system to function improperly, and there will be an overload on the metal inner core.

4. CHOOSE HIGH-PRESSURE COMPRESSED AIR FITTINGS CAREFULLY

Determine the operating temperature. If the hose line near the fittings exceeds 200 F., use a silver-soldered or mechanical-type fitting rather than a soldered fitting. Lead-tin solder might not hold at such temperatures.

MAINTENANCE HINTS

1. METAL CLAMPS

Be sure they are the right size for a snug fit. A loose-fitting clamp will allow vibration and cause excessive abrasion. An over-tight clamp will crush the inner core. You can insert a soft sleeve between hose and clamp to protect the braid.

2. DISCONNECTIONS

When you disconnect one end of a metal hose, watch out that you don't crush the inner core by too sharp a bend.

3. BRAID BREAKS

When the braid covering breaks or tears, it's a good sign that you should repair or replace hose. If the break is near a fitting and the hose is long enough, you can cut off the damaged section and re-apply the fitting.

You can use flexible metallic hose in many problem applications

- It will handle such materials as asphalt, chemicals, coolants, exhaust gases, fuel, lubricants, refrigerants, air, and water.
- It will make safe, flexible connections—
  - —between moving parts of machinery.
  - —between misaligned parts.
  - —to absorb vibration, contraction, expansion, and pulsation.
  - —to convey any type of liquid or gas.

Ductile, Long-Life Floors and Equipment Grout In Union Oil Company Laboratory

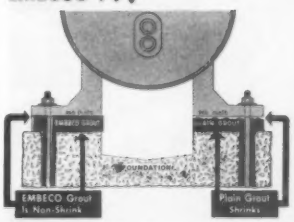
Union Oil Co. Laboratory, Brea, California. Archt.—Austin, Field and Fry; Contr.—P. J. Walker Co.; Cement Contr.—R. J. Hiller Co.—all companies of Los Angeles, California. Masterplate "Iron-Clad" Concrete Floors—non-colored and colored. Equipment grouted with Embeco Non-Shrink Mortar.

CEMENT DISPERSION IS KEY TO SUPERIORITY OF THESE MASTER BUILDERS PRODUCTS

MASTERPLATE . . .

Section of Masterplate Floor. Note Thickness of Armored Surface.

EMBECO . . .



MASTERPLATE "IRON-CLAD" CONCRETE FLOORS
EMBECO Non-Shrink GROUT

More and more builders and owners are taking the position that the floor and grout *are part of the machine . . .*

That is why in many carefully planned structures such as this Union Oil Co. laboratory, long-life Masterplate Floors and Embeco Grout are specified and used.

MASTERPLATE . . . produces a thick, armored surface that has 4-6 times greater wear-resistance than the best plain concrete floor. This "iron-clad" surface, produced when floor is installed or resurfaced, also makes the floor spark-resistant, non-dusting, corrosion-resistant, easy-to-clean, non-slip, economical. Non-colored and eleven colors.

EMBECO . . . counteracts shrinkage — principal cause of failure in equipment grouts. Produces easy placeability, early strength to avoid long, costly shutdowns. Provides full, level bedplate contact, plus ductility to withstand impact, vibration and pounding action.

Full information on Masterplate and Embeco and "see-for-yourself" demonstration kits supplied on request . . . without cost or obligation.

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WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

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MATERIALS HANDLING. 202
MEASURING & CONTROL. 210
SAFETY & PLANT PROTECTION . . . STARTS HERE
VALVES, PIPING & ACCESSORIES. . . 216
MISCELLANEOUS 220

IN THE NEXT ISSUE ..... Some notes on important late items. More about them next month.

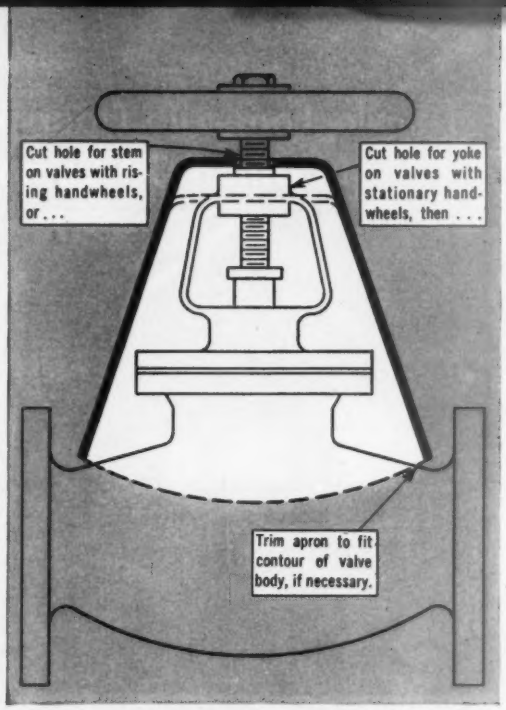
Electric paint remover does the job with radiant heat. You just slide the device along the painted surface. Heat from a Calrod unit makes the paint soften and blister—then it can be removed with a putty knife.
General Electric Co., Schenectady 5, N. Y.

Lane marking tape applicator makes industrial floor marking a 1-man job. Applies tape and rolls it firmly in place as you push it along the floor.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

Handrail — with a flush surface and porcelain enamel finish—has sections attached with concealed internal bolt fastenings. It can be installed with a minimum of labor and tools. No on-the-job welding is needed, says the manufacturer.
Seaporcel Metals, Inc., 28-20 Borden Ave., Long Island City 1, N. Y.

Portable loading ramp hydraulically adjusts to truck bed height in a few seconds. Enables you to roll your fork lifts right into the truck for faster, easier loading and unloading.
John B. Illo Co., 2414 E. 57th St., Los Angeles 58, Calif.

Explosion-proof speaker housing for hazardous locations where explosive gases and vapors are present. Fits all RCA horns and several diaphragm speaker mechanisms.
RCA Victor, Camden, N. J.


Cut hole for stem on valves with rising handwheels, or . . .
Cut hole for yoke on valves with stationary handwheels, then . . .
Trim apron to fit contour of valve body, if necessary.

1 **INSTALLATION OF CHEX-SPRAY** protective valve cover is easy. You just tailor it to your valve by . . .

2 **. . . CUTTING A HOLE** in bottom, slightly smaller than diameter of valve stem. Then you remove wheel and . . .

3 . . . **SLIP THE SHIELD** over the valve stem so that it covers the packing gland. Now you can . . .

4 . . . **REPLACE THE WHEEL,** and the job is done—without taking valve out of service. For inspections, just . . .

5 . . . **TURN SHIELD BACK**—you don't have to remove it, so there's no danger of forgetting to put it back on.

Simple Valve Cover Shields Worker From Hazardous Sprays

IT LOOKS LIKE A FLOWER POT—and it's just as simple. But don't let looks fool you, because this valve shield may be the answer to one of your most serious pipeline problems—the protection of workers from hazardous sprays caused by faulty packing.

The idea for the shield originated several years ago in a Du Pont plant. Safety engineers at this plant had several hundred shields made in their own shop for their own use.

The first shields were handmade and fairly expensive. When Du Pont's engineers were satisfied with the merits of their brain-child, they turned the idea over to Industrial Products Co. for commercial development.

The Chex-Spray valve shield is made of neoprene synthetic rubber. And it is designed for use on valves handling steam, acids, and other hazardous chemicals.

Chex-Spray protects your operators from injury if the valve stem packing should fail. It cups the stem and the packing gland, and prevents steam or acid from spraying on the operator or anyone standing close by.

To install it, you just cut or punch in the bottom a hole slightly smaller than the valve stem diameter. Then you remove the valve wheel and pull the shield down over the stem so that it covers the packing gland. If necessary, you can trim the edge of the skirt to fit the contour of the valve body. The photographs tell all.

The advantages of Chex-Spray as seen by the maker are:

- You don't have to wire it in place.
- You can install it while the valve is in use.
- It's flexible. You just turn back the shield to inspect valve or to tighten packing gland nuts.
- It need not be removed. There is no risk that it will not be replaced after inspections.
- It lasts longer. Neoprene is resistant to most acids, alkalis, and hydrocarbons. Outdoors it's much more resistant than natural rubber to deterioration by weathering and sunlight.

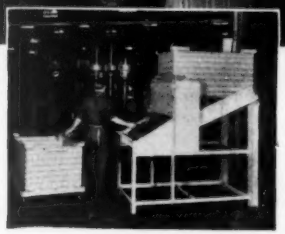
You can get Chex-Spray shields in three valve sizes ranging from ¾-in. to 4 inches. Shields for larger valve sizes are planned if the demand is great enough.

Industrial Products Co., 2820 N. Fourth St., Philadelphia 33.

Turn the page

STORE MORE!

...with space-saving Work-O-Matic* Boxes



← *Inset: Note easy access to materials-in-process when a patented Work-O-Matic Box is used on a Union Metal Positioning Stand. Reservoir supplies operator while empty box is being replaced.*

IS storage space a problem in your plant? Work-O-Matic Multi-Duty Boxes can really help solve it!

Here *four* Work-O-Matic Boxes are stacked in the same space required for *three* ordinary boxes—33⅓% more storage in the same floor area!

Interesting facts:

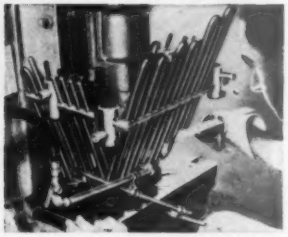
1. Stacked height—120″ overall.
2. Floor space used for stack of four Work-O-Matic Boxes—11⅓ square feet.
3. Volume of material stored on 11⅓ square feet of floor space—81 cubic feet.

There's nothing like a Work-O-Matic! Find out how these new, drop-bottom boxes have also cut handling costs, and often boost production more than 50%! Write The Union Metal Manufacturing Company, Canton 5, Ohio. *Patent No. 2,446,036. Other patents pending.

UNION METAL
Materials Handling Equipment

SAFETY & PLANT PROTECTION

Begins on page 168



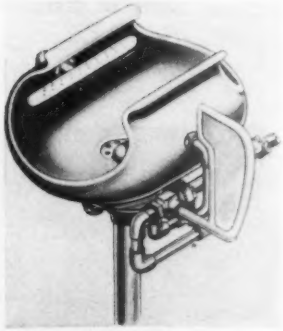
Power Press Guard

You can get this guard for punch presses of all sizes, makes, and types. And it's custom built to your specifications for lower cost and better protection.

The front and side barriers can be tilted in or out. Vertical rods can be moved up or down to clear die straps, air nozzles, etc. And you can tilt or take off the whole front barrier in a few seconds to remove double or damaged blanks from the die.

Searjeant Metal Products, Inc., Mendon, N. Y.

■



Eye-Wash Fountain

This fountain will wet instantly all parts of the face without the danger of recontamination. It meets the need for emergency treatment of eyes, ears, nose, and mouth injured by acid burns, dust, fumes, heat, or contamination.

The fountain will spray a large volume of water at normal pressure. And it meets fully all known

a matter of confidence

Specialists who designed this speed reducer entrusted production of its bronze worm gear blank to other specialists.

Foote Bros. Gear and Machine Corporation, Chicago, leading producers of Speed Reducers, Gears, and other quality Power Transmission Components for practically any industrial requirement, identify themselves with the phrase "BETTER POWER TRANSMISSION THROUGH BETTER GEARS."

For over twelve years, Foote Bros. have purchased thousands of ½ pound to 1500 pound non-ferrous gear blanks from National Bearing Division—confidently entrusting their reputation and industry leadership to special foundry skills for which National Bearing is famous.

And Foote Bros. confidence is well placed.

National Bearing's proven ability to mass produce exceptionally fine-grained, non-ferrous castings, free from blow holes and sand inclusions, can be depended upon under even the most exacting engineering and manufacturing specifications.

As a typical customer service-plus, National Bearing Division's engineers and foundrymen recently designed, and produced for customers like Foote Bros., a bronze gear blank that contains even higher physical properties.

Through a new foundry technique, National Bearing imparts greater hardness, finer grain, and more tensile strength to the bronze gear blank ring, to a depth below where the teeth are cut. In addition, this new process gives such extra advantages as higher uniformity, closer tolerances, and economy of stock.

If your product requires special mass-produced non-ferrous castings or bearings, National Bearing Division has the foundry facilities, experience, and skill that will insure better product performance, and may possibly lower product costs through production-run economies. You are invited to write to National Bearing Division for complete information.

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4928 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

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Pioneers and Leaders in INDUSTRIAL DUST CONTROL

Sly Dust Filter used for the collection of fine, float, silica dust in a large southern California plant.

SLY will solve your Dust Problem

- Fifty years' experience with literally thousands of successful installations.

Sly Dust Filters are used on such difficult dust as powdered sugar, bentonite clay, paint and pigments, aspirin and other pharmaceuticals, chemicals of all kinds, talc, lime, detergents.

Sly Dust Filters are not expensive. A Sly engineer is near you to discuss your problem with you. Ask for Bulletin 98.

THE W. W. SLY MANUFACTURING CO.
4755 Train Avenue • Cleveland 2, Ohio
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SAFETY & PLANT PROTECTION

Begins on page 168

industrial hygiene, recontamination regulations, plumbing, and sanitary standards.

Logan Emergency Showers, Inc., P.O. Box 111, Glendale, Calif.

■

Portable Fire Pump

This new self-priming, centrifugal pump weighs only 57 lb. Its capacity is 15,000 gph. It delivers water at pressures up to 100 lb. And it's just as effective with fog, spray, stream, or foam.

The light-weight, two-cycle engine develops 7 hp. at 4500 rpm. Lubrication is obtained entirely from the fuel mixture—no greasing or separate oiling is needed.

McCulloch Motors Corp., Los Angeles.

■

TWO-QUART EXTINGUISHER of the vaporizing liquid type features fast, one-hand operation with accurate control. Aim, squeeze the grip — and a powerful 30-ft. stream is instantly released by the new Pressurized Model B Extinguisher, made by Fyr-Fyter Co., Dayton, Ohio. Liquid is completely discharged in 17 to 25 seconds by pressurized nitrogen. The entire valve assembly and pick-up tube unscrew as a unit from the shell to simplify inspection.

Turn the page

THOMAS

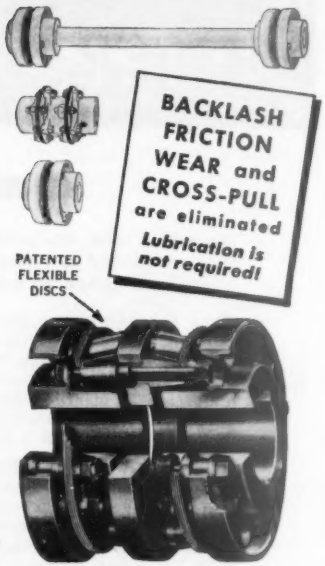
Flexible ALL METAL COUPLINGS

FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years



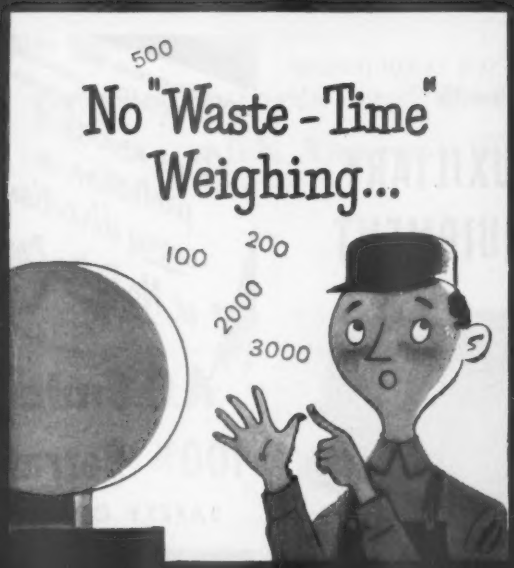
THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA



No "Waste-Time" Weighing...

WITH

FAIRBANKS-MORSE

You speed your weighing operations with Fairbanks-Morse Bench Dial Scales. And that means there are no "bottlenecks" to hold up production all through your plant. Here's why:

With Fairbanks-Morse Bench Dial Scales, weights are read right at the point of the indicator. No time-wasting mental calculations are needed. You can weigh as fast as material can be moved on and off the scale platform. And, easy-to-read charts plus elimination of mental calculations reduce the possibility of human error . . . stop profit-eating weighing losses.

To eliminate "waste time" weighing in your operations, consult your Fairbanks-Morse weighing expert. Or, if you prefer, write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS
HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

Adhesive Backed
TREATED FELT TAPES
1. Install Faster
2. Resist Deterioration

PRC tapes feature natural anti-deterioration and rattle cushioning values. Special impregnations also provide unmatched *protective sealing* characteristics. FOR EXAMPLE:

CHROME LOCK
This product inhibits electrolysis and corrosion. Is also anti-wicking. Seals under pressure. Adhesive back is pressure sensitive. TYPICAL SEALING APPLICATIONS: Instruments; glazing channel window sash; skin laps on bus bodies; weatherseal for trailercoaches.

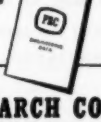
KLING FELT

Features a new, solvent-activated adhesive (one side only) that sticks to all surfaces. Can be applied to cold metal. WON'T PULL LOOSE!

TYPICAL APPLICATIONS: Weather Strip for windows, doors, etc.; dust and moisture seal for electric control panels; rattle cushioner.

PRE-SEGMENTED
PRC tapes can be supplied in segmented rolls according to order. Each segment is pre-cut to a sufficient depth to permit easy detaching. Ideal for volume application of equal-size pieces.

Write for free test sample and new engineering folder—TF-310

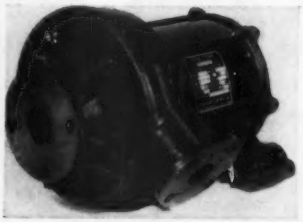


PRC

PRODUCTS RESEARCH CO.
3136 LOS FELIZ BLVD., LOS ANGELES 39, CALIF.
Representatives in All Principal Cities

Begins on page 168

AUXILIARY EQUIPMENT



Pump With Only One Moving Part

Chempump is said to eliminate the toughest pump maintenance problem—mechanical seals and stuffing boxes. It has only one moving part—a combined rotor-impeller enclosed in a casing separate from the stator. Drive is magnetic.

The fluid being handled circulates freely in the rotor chamber. It is isolated from the motor windings by a stainless steel cylinder—.010-in. thick—inserted in the stator.

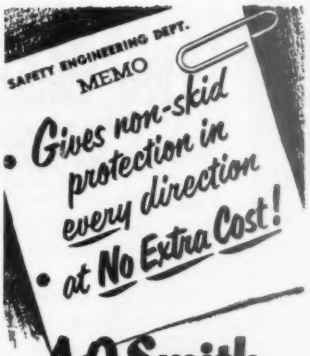
The makers also say that external lubrication is not needed. Pump or bearing lubrication is provided at all times by the fluids being handled. Or by factory-installed lubricants when handling abrasives.

A circulation line returns 15-30 gph. of any clear liquid being pumped through the rear of the rotor chamber. This action limits the temperature rise in that section of the pump and aids in lubrication.

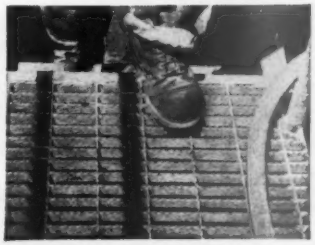
The complete unit is 14⅝-in. long by 9⅜-in. in diameter. Fully-enclosed motors are standard equipment. The integral motor-pump construction assures built-in alignment, it is claimed.

Chempump Corp., 1300 E. Mermaid Lane, Philadelphia 18.

Turn the page



A.O.Smith
100% Serrated
SAFETY GRATING



When Feet Slip...

they don't choose the direction of slip. A safe floor is one that never loosens its grip on a man's shoes. A safe floor is one that offers non-skid protection in every direction.

An A. O. Smith 100% serrated safety-floor won't sneak out from under a man. It's made with a grip that moves in from every direction. Look at the picture—with serrations on both the *bearing bars and the cross bars*, safety travels a two way street.

MAKE SURE OF SAFETY

A. O. Smith 100% serrated safety grating completely engineered and fabricated to your individual requirements is available in principal cities.

A.O.Smith
CORPORATION
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New York 17 • Chicago 4 • Houston 2
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Customer Reports:

Fewer Rejects and Better Bushings with Asarcon 773 Bearing Bronze!

An automobile manufacturer virtually eliminated bushing rejects by using Asarcon 773 Continuous-Cast Bronze instead of foundry castings. The Asarcon bronze, supplied by Meier Brass & Copper Company, Detroit (distributor), is, according to the user, "more uniform than the sand-cast product." It is also "available in lengths of 105", with other dimensions held to extremely close tolerances."

There is less waste because there is none of the short-end scrap associated with standard 13" stock. The bronze is cut only in the length needed. Better bushings result because Continuous-Cast Bronze is entirely free from porosity, hard and soft spots, dirt, dross or imperfections of any kind. Machining is easy; cutting tools are less subject to wear.

Asarcon 773 (SAE 660) bearing bronze is stocked in 105" lengths by distributors all over the country. This warehouse stock will be cut *long or short* to suit you. There are 216 sizes, tubular or solid round, in diameters from ½" to 5".

ASARCO CONTINUOUS-CAST RODS TUBES SHAPES ®

West Coast Sales Agent:
KINGWELL BROS. LTD., 444 Natoma Street, San Francisco, Calif.

American Smelting and Refining Company
OFFICES: Perth Amboy Plant, Barber, New Jersey
Whiting, Indiana

American Smelting and Refining Company
Perth Amboy Plant, Barber, New Jersey

Please send me a free copy of the 12-page catalog "Asarco Continuous-Cast Bronze."

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

ACADIA *Silicone* RUBBER

RESILIENT AT
(−100°F to +500°F)
Numerous fields of application to improve products are opened by extreme heat-resisting Acadia Silicone Rubber. It is successfully serving in many forms at temperatures ranging from −100°F to +500°F and remains resilient.

Acadia Silicone chemists have at last provided a material that stands extreme heat and increased tensile strength for better compression. Other advantages are resistance to fungus, ultra-violet rays, strong acids and oils. Its dielectric properties are excellent. It is odorless and stainless.

Acadia Silicone is now available molded or extruded for such components as gaskets, seals, "O" rings, washers, sheet, tubing, cut-parts, packings to meet extraordinary service.

Write for complete data. An Acadia sales engineer nearest you is at your service. Branches in principal cities.

DIVISION OF WESTERN FELT WORKS

ACADIA *Synthetic* PRODUCTS

Processors of molded and extruded synthetic rubbers and many thermoplastics for almost any component use.

DIVISION OF WESTERN FELT WORKS • *Manufacturers and Cutters of Wool Felts* • 4035-4117 OGDEN AVE. • CHICAGO 23, ILL.

NEW AUXILIARY EQUIPMENT

Begins on page 174

Liquid Chiller and Ice Builder

Here's a cooling system especially designed to handle oils and grinding compounds from high-speed machines. It can also provide large quantities of cold water and has a wide range of other industrial uses. Ice gives ample cooling capacity with a minimum of connected horsepower, maker says.

All-copper interior eliminates corrosion. Liquid travels about 60 lineal feet throughout cooling cycle. Models range from ¼ hp. to 25 hp.

Brunner Mfg. Co., 1821 Broad St., Utica, N. Y.

■

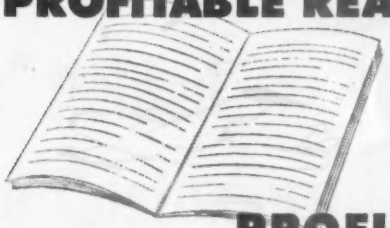
High-Load Pillow Blocks

Maximum strength and minimum size are claimed for the new Dodge-Timken pillow blocks. They are self-aligning, with spherical outer race. And they come in both expansion and non-expansion types. Double piston ring seals keep lubricant in and dirt out of the bearing mechanism.

Dodge Mfg. Corp., Mishawaka, Ind.

Turn the page

PROFITABLE READING



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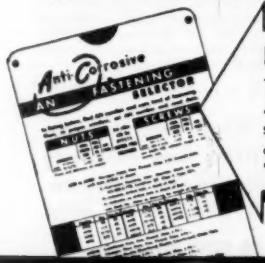
When you think of

STAINLESS STEEL FASTENINGS

think first of

ANTI-CORROSIVE

Anti-Corrosive has millions of stainless fastenings *in stock* (probably the largest selection of varieties and sizes in the world) for *immediate delivery*. Anti-Corrosive has the exceptional production capacity that can fill your requirements beyond stock items faster, *better!*



FREE—A-N Stainless Fastening Selector

This handy slide-chart instantly identifies A-N Nos. pertaining to stainless steel nuts, screws, bolts, rivets, cotter pins, washers; gives sizes and other data. Write for "Chart 52J" TODAY!

25 YEARS OF LEADERSHIP IN FASTENINGS OF STAINLESS STEEL

Anti-Corrosive Metal Products Co., Inc.

Manufacturers of STAINLESS STEEL FASTENINGS

CASTLETON ON HUDSON, NEW YORK

NEW AUXILIARY EQUIPMENT

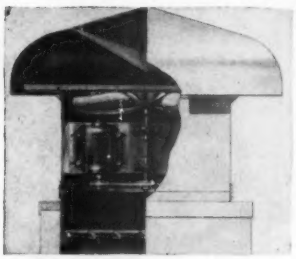
Begins on page 174

Lubricator Warns When Oil Level Is Low

The new Oil-mist lubricator turns on a horn and red light, or cuts off the machine, when the oil level gets too low. An automatic switch makes it impossible for the unit to run dry accidentally. Models with 1-gal. and 12-oz. reservoirs are available.

Alemite Division, Stewart-Warner Corp., Chicago 14.

■



Low-Type Ventilator

It's built for modern design—low in height, and with eye appeal—say the Burt people. This ventilator can be used as an exhaust or fresh air supply. Sizes range from 12-in. to 60-in. fans. The unit can be supplied with either a direct motor-driven fan or with a V-belt and pulley drive. Standard construction is prime galvanized steel, but other material can be used.

Burt Mfg. Co., Akron, Ohio.

Turn the page

These "Firsts" Helped Westinghouse Customers

USERS OF WESTINGHOUSE TUBES GET FIRST BENEFITS FROM MANY NEW TUBE DEVELOPMENTS

These are only a few of the "firsts" that Westinghouse created in the electronic tube industry. In each case, designers using Westinghouse Tubes gained advantages by having first chance to use these innovations.

Today, Westinghouse still pioneers in electronic tubes and tube making. For instance, Westinghouse 40 KV and 20 KV rectifying tubes are under 9 ounces, only 2¾" high. Designers seeking the ultimate in space and weight savings will find them in these new WL-6102 and WL-6103 tubes.

Radical new developments in other power tubes and receiving and television picture tubes are now being engineered at the *NEW* Westinghouse Electronic Tube Division at Elmira and Bath, New York.

NEW SERVICE, NEW DISTRIBUTION

Westinghouse plans for Electronic Tube Division expansion are in operation. New service facilities, new warehousing policies, and new distributors are opening rapidly.

New merchandising methods will aid distributors in serving industrial users—many of these business-building programs are totally new in the tube industry. Here, as elsewhere, Westinghouse plans to provide industry leadership in service.

It pays in profits to deal with Westinghouse and with Westinghouse distributors. For full information on how Westinghouse can help you with problems of design, service, or supply, call your nearest Westinghouse representative, or write to Department F-110.

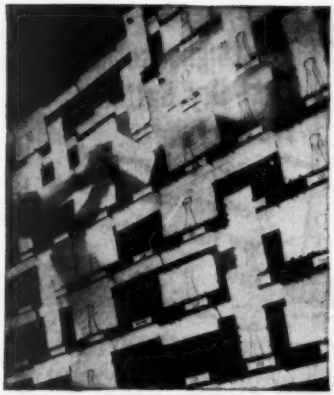
RELIATRON™ TUBES

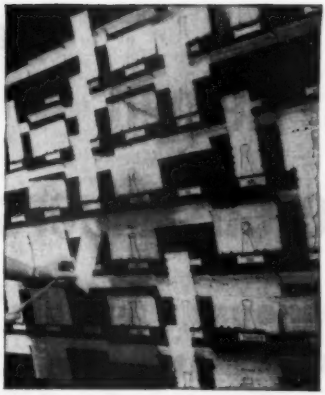
YOU CAN BE SURE...IF IT'S Westinghouse

ET-95003

ELECTRONIC TUBE DIVISION

Westinghouse Electric Corporation
Box 284, Elmira, N. Y.





One movement of Job Time Ticket on these McCaskey Boards directs dispatcher, move-men, set-up men and operators according to production plan . . . with

NO ASSEMBLY DELAYS FROM MISSING PARTS NO EXCESS WORK IN PROCESS

Barcalo Manufacturing Company, Buffalo, N.Y. has met the problems of dispatching production of a widely diversified line of products . . . from hand tools and metal furniture to pillows and mattresses . . . with McCaskey Machine Loading, Scheduling and Job Assignment.

Shop orders formerly were handled in a "blind file" and one or more parts often were overlooked or delayed with serious results. This is totally eliminated by the use of McCaskey Machine Control Boards and the following procedure developed by W. J. Navelle, Production Control Manager:

1. Job time tickets are pre-written without operators' clock numbers (see paragraph 7) and assigned to machines by Production Control Department.
2. They are placed by dispatcher in rear pockets of McCaskey Machine Control units in sequence specified by Production control. Load is recorded on load cards.
3. Foreman selects jobs to be run next and moves tickets to front pockets of control units.
4. Dispatcher issues stores requisition for material, attaches to and notes action on job ticket.
5. Material move-man takes requisition to stores, delivers material to or near machine and marks ticket when move is complete.
6. Set-up man checks board, draws tools and dies and marks ticket when job is ready to run.
7. Job is assigned to operator by dispatcher; his number is written and starting time is stamped on ticket. Ticket then is visibly filed under clip spring at front of control unit.
8. When job is finished, dispatcher rings out ticket, enters production summary on permanent record and sends ticket to Production Control.
9. Production Control completes its record and sends ticket to Payroll Department.

Foreman, by quickly referring to McCaskey Board, selecting jobs to be run and moving job tickets thus provides instructions for (1) dispatcher, (2) move-men, (3) set-up men and (4) operators. Jobs are run and essential operations performed according to Production Control's plan. This McCaskey installation once again demonstrates how readily duplicated effort, delays and confusion are replaced by economical, planned production.

Let us talk with you about a McCaskey procedure for your department or plant. Equally adaptable to line or job shop production, assembly, maintenance or individual job assignment. Mail coupon today for complete information.

McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me bulletins describing McCaskey Machine Loading, Scheduling, Dispatching and Job Assignment.

Name .....

Position .....

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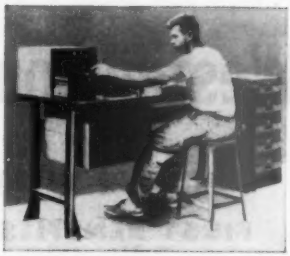
NEW AUXILIARY EQUIPMENT

Begins on page 174



Drawer Units to Fit the Job

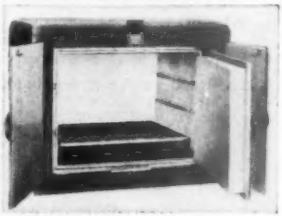
Here's a simple answer to your drawer space problem. A screwdriver, a wrench, and a little imagination are all you need for the new SPS all-steel units.

They can be assembled to stand on the floor, on cabinets, on bench tops; to hang from benches; or to use on tool stands and desks.

And they can always be knocked down and re-assembled to meet changing space conditions. Each drawer unit is completely enclosed.

Standard Pressed Steel Co., Box 546, Jenkintown, Pa.

■



Portable Oven

This high-temperature electric oven is built to nest in groups or banks. And it can be moved in your plant as needed. Individual ovens in a group can be cut out or used at different temperatures. Thermostat-controlled temperature range runs from 300 to 1000 F. Operates on 220 volts, single phase.

Grieve-Hendry Co., Chicago.

Turn the page

What Do You Want Most in Tube Fittings?

NO LEAKS

ability to withstand VIBRATION

FASTER assembly

Get Them ALL in IMPERIAL *Hi-Duty*® FITTINGS

The Tube Coupling that will not leak even under vibration

Imperial Hi-Duty Fittings withstand over 5 times as much vibration as ordinary Compression or Flared brass fittings. Design of sleeve minimizes deformation of tubing in assembly—tubing is kept stronger at points of greatest stress. Trouble-proof performance proved by widespread use in severe applications.

SLEEVE SHEARS OFF AT GROOVE

★ For Tubing ⅛" to ¾" O.D.

★ Available in Brass or Aluminum

★ Ask for Bulletin No. 3002

Easier and Quicker to Assemble

Fitting comes with nut assembled. To get a tight joint, simply insert tube into fitting and tighten nut. No loose sleeve to drop . . . no flaring required. Makes repeated tight reconnections.

With IMPERIAL you can be sure of the finest in fittings . . . fittings that have *forged* bodies on elbows and tees providing greater strength and toughness . . . *long* Dryseal pipe threads for extra assurance of tight pipe connections. See Catalog 350.

See Your Industrial Supply House

THE IMPERIAL BRASS MANUFACTURING COMPANY

517 S. acine Avenue, Chicago 7, Illinois

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IMPERIAL

Pioneers in Tube Fittings and Tube Working Tools

Make This Date NOW!

. . . for YOUR Benefit

MEMO

Don't Say It — Write It

Miss M—

Make no appointments for me Dec 1-6. I'll be attending the National Power Show in New York. That Harrison deal can wait, and so can anything else. Seeing the Power Show is always a must.

P.S. Expect to take Joe and Bill along.

J.B.

Anyone concerned with steam, electric, or mechanical power problems can benefit greatly by attending this outstanding Exposition. Concentrated here will be interesting displays and informative demonstrations on . . .

317 **DIFFERENT KINDS OF PRODUCTS**
No where else can you see and compare so many things of vital interest to you and your company . . . in so little time.

344 **LEADING MANUFACTURERS**
will be represented by technical men on hand to show you the latest equipment, materials, and methods for power production, distribution and use, and to help solve your present problems and future requirements. Yes, a wealth of NEW IDEAS awaits you at the

20TH NATIONAL POWER SHOW

National Exposition of
Power & Mechanical Engineering

GRAND CENTRAL PALACE, New York

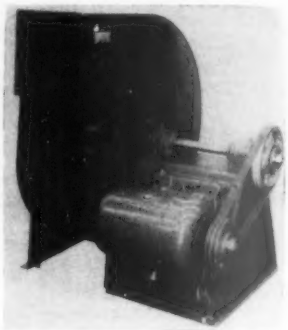
DEC. 1-6

ASME Auspices in conjunction with Annual Meeting

MANAGEMENT INTERNATIONAL EXPOSITION CO.

NEW AUXILIARY EQUIPMENT

Begins on page 174



Industrial Fan

You can get this rugged industrial fan with either an air handling, a materials handling, or a long shavings wheel.

The fan is made in 11 sizes. Capacities range from 670 to 44,000 cfm., and pressures up to 16 in. water gage.

The air handling wheel has backwardly inclined blades featuring low power consumption over a wide range of volumes and pressures.

Westinghouse Sturtevant Div., Hyde Park, Boston 36.

■

Overhead Crane

The new "Shaw-Box" Series D electric cranes provide service for average industrial needs at much less cost than the usual heavy duty cranes, according to the manufacturer. This new line offers features found only in the most expensive cranes. They need little overhead space but give high hook lifts.

Shaw-Box Div., Manning, Maxwell & Moore, Inc., Muskegon, Mich.

Turn the page

SINEWED FOR EXTRA STRENGTH WITH DU PONT "CORDURA"!

3-inch belt replaces standard-type leather belt . . . shows no slippage . . . no stretch!

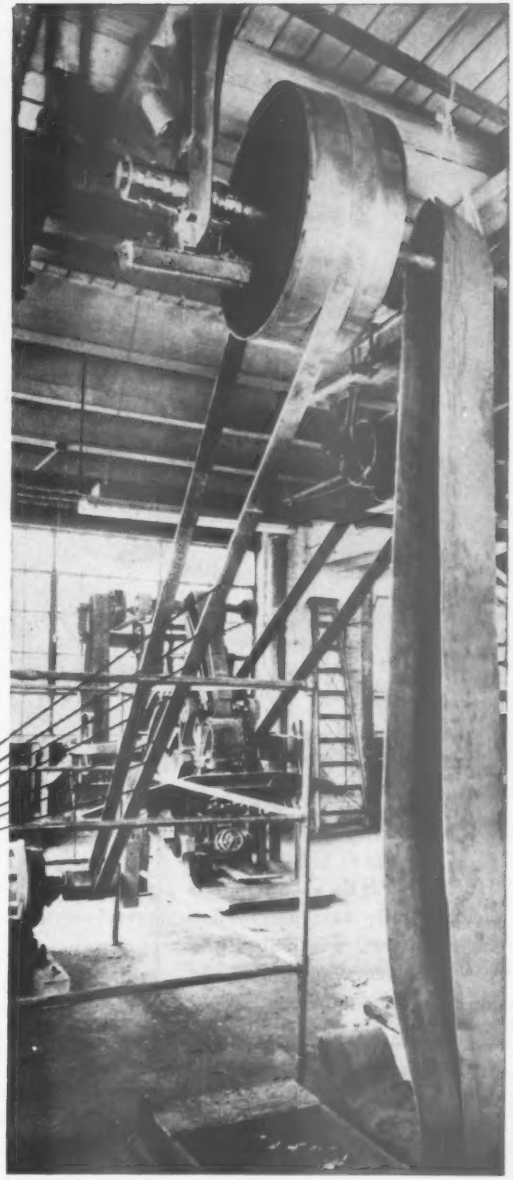
Thin cords of Du Pont CORDURA* High Tenacity Rayon placed between laminations of leather in the 3-inch belt pictured here add virtually stretch-free strength to leather's natural hold.

Engineers find that belts reinforced with this Du Pont yarn permit more power per inch of belting, require fewer take-ups, less maintenance.

You'll find "CORDURA" in an ever-widening variety of products today . . . the unseen component that makes truck tires stronger and safer at high speeds, hoses lighter yet tougher, conveyor belts more flexible with better troughability.

Find out how "CORDURA" improves products you use, and may also improve products you make. Send the coupon for the free booklet "Sinews for Industry."

*REG. U.S. PAT. OFF.



"Cordura"
STRENGTH AT LOW COST

HIGH TENACITY RAYON

DU PONT

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Textile Fibers Department
E. I. du Pont de Nemours & Co. (Inc.)
Room 4421-F5, Wilmington 98, Del.
Please send me the free booklet "Sinews for Industry."

Name_____ Company _____

Address_____

City_____ State_____

SHENANGO Centrifugal CASTINGS ... KEY TO SAVINGS

You'll do better

WITH SHENANGO

CENTRIFUGALLY CAST PARTS

HERE'S WHY . . . Shenango centrifugally cast parts offer many inherent advantages that can help you avoid trouble and save time and money.

For example, due to the centrifugal casting action, you get a more uniform, pressure-dense metal, free from sand inclusions, blow holes and other often-hidden defects. You get higher strength, greater wear resistance, better elongation—longer lasting parts, better able to withstand severe service of *any* kind.

So if your plans call for symmetrical shapes, anywhere from tiny bushings to huge rolls, ferrous or non-ferrous, rough or finished, check with Shenango. Company after company finds it a good way to do a better job at lower cost.

SHENANGO-PENN MOLD COMPANY

Centrifugal Castings Division

Dover, Ohio

Executive Offices: Pittsburgh, Pa.

SHENANGO

ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES

MONEL METAL • NI-RESIST • MEEHANITE METAL

WHAT'S NEW IN EQUIPMENT

Begins on page 168

ELECTRICAL EQUIPMENT

Panelboard Built on the Spot

No more waiting for factory assemblies, say the manufacturers of the new Stab-lok panelboard. They claim you can assemble it in minutes—and slash installation costs.

Just get the correct size enclosure and the required number of 1- and 2-pole Stab-lok circuit breakers from distributor's stock. All you do is slide the end of the circuit breaker over a rugged metal hook and press 4-way stabs into the proper slot in the bussing. No screws. And you don't need any tools.

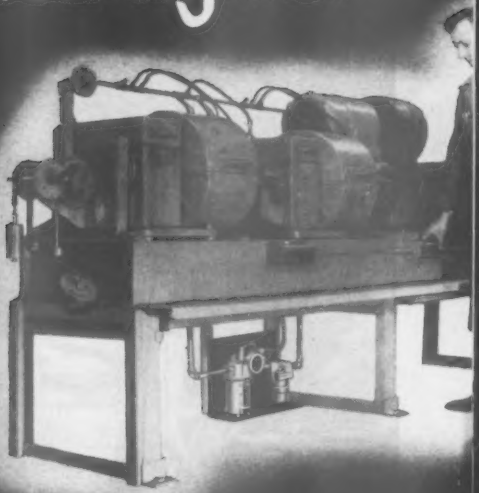
Polarity sequence provides complete flexibility for almost any requirement up to 42 circuits. And the whole interior is said to be quickly removable.

Federal Electric Products Co., 50 Paris St., Newark 5, N. J.

Turn the page

Sensational "Friction Fighter"

Alemite OIL-MIST Lubrication



*** cut bearing temperatures from 110 degrees to 70 degrees!**
lubricated 66 bearings daily with 1½ ounces of oil!
gained ½ hour's production time daily!

Now from Alemite—world leader in lubrication—comes this great friction fighting achievement. Alemite Oil-Mist! The most efficient, continuous, fully automatic system in the field of machinery lubrication.

Alemite Oil-Mist! The System that atomizes oil into *mist*—distributes it through tubing to bearings—bathes *all* bearing surfaces with fresh, clean, cool oil film. A system that simplifies and materially cuts the cost of machinery lubrication. And the lubricator unit has no moving parts.

Oil-Mist uniformly maintains oil film on plain and anti-friction bearings, gears and chains *regardless of variations in load, temperature or speed.* Eliminates the "human element."

ALEMITE OIL-MIST
Lubricates All Types of Mechanisms

*** Here's Proof of Oil-Mist Results Direct from a Field Report!**

Before Oil-Mist: It took a full pound of grease and 30 minutes "downtime" daily to lubricate a highly specialized machine at a wire and cable manufacturing plant. 32 of the machine's 66 bearings couldn't even be reached for lubrication, and the average bearing temperature was a hot 110 degrees.

After Oil-Mist: Lubrication of the machine is now fully automatic with a saving of 30 minutes production time daily. Just 1½ oz. of oil lubricates *all* 66 bearings and bearing temperature is now only 70 degrees. Life of bearings is greatly extended!

Alemite OIL-MIST Lubrication

Check All These OIL-MIST Advantages!

- **Continuous, uniform lubrication of all bearings.**
- **Air pressure seals bearings against dirt.**
- **Reduces oil consumption—up to 90%.**
- **Prevents product spoilage.**
- **Eliminates guesswork—each bearing picks up as much Oil-Mist as it needs.**
- **Reduces starting and running torque.**

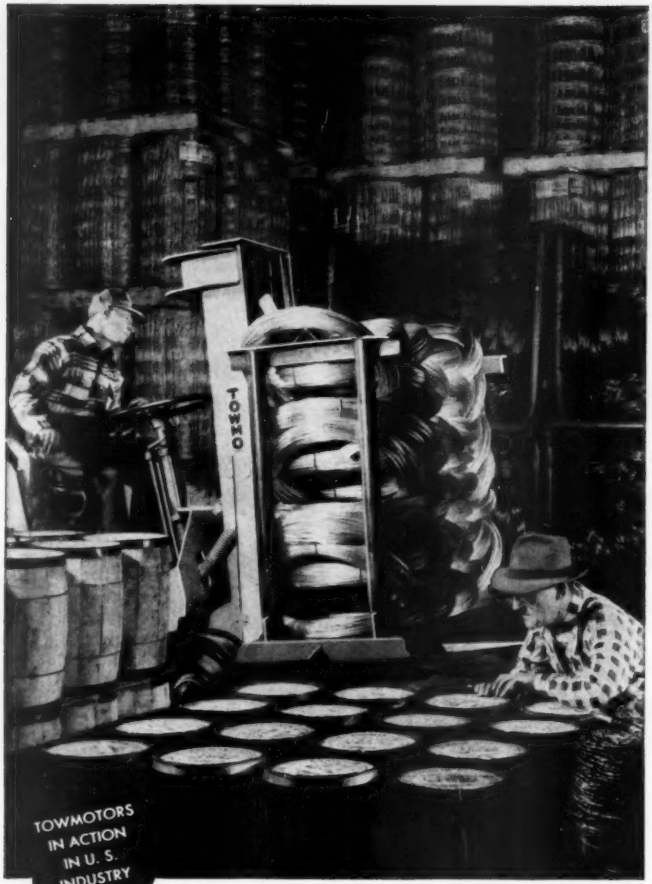
Get the facts NOW!

Alemite, Div. of Stewart-Warner, Dept. G-102
1850 Diversey Parkway, Chicago 14, Illinois

☐ **Please send me a FREE copy of your new and complete Oil-Mist Catalog.**
☐ **Please have your Alemite Lubrication Representative arrange a desk-top demonstration of Oil-Mist.**
This entails no cost or obligation on my part.

My Name _____
Title _____
Company _____
Street _____
City _____ **State** _____

A PRODUCT OF SW STEWART-WARNER



Handling heavy coiled wire with Towmotor at Jones & Laughlin Corp., Pittsburgh, Pa.

give production a big hand...

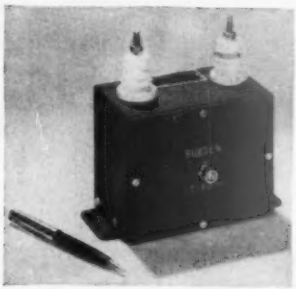
Towmotor makes one man ten times better when it comes to handling heavy loads at top-production speed. Output soars and handling costs sink accordingly... gains that fast cancel Towmotor's modest first cost. From then on it's a steady pay-off because there's real staying power built into Towmotor Mass Handling Equipment. "Man Hour Thieves" tells the whole timely story. Write for your copy and name of your nearest Towmotor Representative to: Towmotor Corporation, Div. 5, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG
®

FORK LIFT TRUCKS and TRACTORS
SINCE 1919
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

NEW ELECTRICAL EQUIPMENT

Begins on page 184



Safer D-C Voltage Reactor

Safer because the instrument circuit is insulated from the power source, explains GE. This new reactor was developed for remote measurements of d-c voltages up to 1200.

It has no moving parts. Needs little or no maintenance. And initial instrumentation costs are said to be reduced since the reactor needs no special safety precautions or expensive construction in bringing leads to a remote instrument panel. A new device permits final adjustment of output current to burden used.

General Electric Co., Schenectady 5, N. Y.

■

Easier on the Eyes

Apertured fluorescent reflectors that throw 10% of light upward are said to eliminate harsh brightness contrasts and dark ceilings.

Maker also claims cooler, cleaner operation for the new CFI Day-Line fixtures. A constant flow of air passes through the apertures, around the lamps—reduces dust deposits, cuts cleaning time.

The porcelain enamel reflectors are fastened to 20-gauge steel channels by 2-in. captive wing nuts. They can be put on, taken off in less than a minute without tools, the maker says.

Day-Brite Lighting, Inc., 5411 Bulwer Ave., St. Louis 7, Mo.

Turn the page

A Century MOTOR With Gas Mask PROTECTION

Underwriters Approved EXPLOSION PROOF MOTORS

Take a look at these Century Explosion Proof Motor features:

- Vital motor parts protected — sealed into inner frame.
- Motor can be reversed without changing direction of the fan — fan runs in either direction.
- Uniform ventilation surrounding outside of inner frame.
- Smooth, straight-through ventilating passages.
- Winding electrically insulated 6 different ways.
- Unusually free from vibration.
- Ball bearing housing keeps grease in — dirt out — lubricated for several years' normal service, with grease plugs for additional lubrication, if necessary.
- Easy-to-remove fan guard is held securely in place with two screws.
- Smooth exterior surface is easy to clean.
- Cast iron frame with integrally cast feet resists rust and corrosion — even when mounted in places where processed materials may contact the feet.
- Rugged construction gives generous safety factor for rough handling.

CE-760

Your property and employees are protected, because this Century Explosion Proof motor is totally enclosed—sealed to prevent a motor spark from causing an explosion.

Class I, groups C and D are used in atmospheres containing flammable gases or vapors: Ethyl ether vapors, gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors and natural gas.

Class II, groups E, F and G are used in atmospheres containing combustible dusts: Metal dust, carbon black, coal or coke dust and grain dusts.

Naturally, corrosive or abrasive materials in the air are also sealed out of the vital parts.

For your protection, specify Century motors on new equipment or for replacement. Your nearby Century Distributor will be glad to give you full information on the complete line of Century motors—from 1/8 to 400 horsepower. We are limited in some sizes of the Explosion Proof motor.

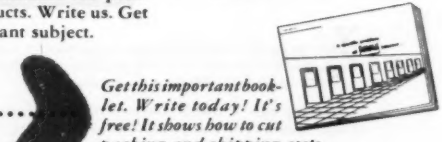
Century C MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Our packaging engineers have just designed new and different containers for *each* of these products. They are lightweight and extra strong! They are *designed* to cut packing and shipping costs, to speed production! They are good looking, too! We have experience in designing better shipping containers for practically all types of products. Write us. Get the facts on this important subject.



Get this important booklet. Write today! It's free! It shows how to cut packing and shipping costs.

ALL TYPES OF ENGINEERED SHIPPING CONTAINERS

General BOX COMPANY

1807 Miner Street, Des Plaines, Ill.

District Offices and Plants:

Cincinnati, Denville, N. J., Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Sheboygan, Winchendon, General Box Company of Mississippi, Meridian, Miss., Continental Box Company, Inc., Houston, Dallas

General Wirebound Crate | *General Nailed Box* | *General Corrugated Box* | *General Cleated Corrugated Container* | *General All-Round Box* | *Generalift Pallet and Pallet Box* | *General Watkins-Type Box*

NEW ELECTRICAL EQUIPMENT

Begins on page 184

Hermetically Sealed Toggle Switch

It doesn't matter where you use this toggle switch, says the maker. It will not be affected by corrosive atmosphere, dust, dirt, oil, or water.

Tentative ratings are: 5-amp. motor load, 30 volts d-c; 10-amp. inductive load, 30 volts d-c; 25-amp. resistive load, 30 volts d-c; 1-amp. a-c for any type of load, 125 volts a-c.

Micro Switch, Freeport, Ill.

■

Weatherproof Lamp Holder

The Stonco Cushion-Seal Holder will cure your outdoor lighting headaches, say its makers. Big feature is a high-temperature, silicon rubber cushion-seal that hugs the neck of the lamp.

The new unit is made of non-corrosive cast aluminum with a glazed porcelain heatproof socket. The silicon cushion-seal is backed with an impregnated asbestos heat barrier and locked in place by a rigid aluminum reinforcing disc.

Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J.

Turn the page

It's here! New Bruning Copyflex 14

speeds Production Control, Work Tickets, Accounting, Purchasing, Shipping, All Factory Paperwork!

Bruning announces its COPYFLEX 14—the revolutionary new management tool for increasing efficiency throughout factory and office.

Especially designed for desk-side copying of any system, accounting or office form, the "14" gives you error-proof, smudge-proof, low cost copies *in seconds*.

It is the newest of Bruning's renowned COPYFLEX machines—standard white-print equipment for engineering departments everywhere.

Typical COPYFLEX users* reap savings!

1. COPYFLEX *saves* life insurance company $100,000 yearly via loan processing system.
2. COPYFLEX *enables* apparel manufacturer to lower product price with production control, order-invoice system.
3. COPYFLEX *speeds* manufacturing, saves hundreds of man-hours, for large metal fabricator via production control system.
4. COPYFLEX *saves* national merchandiser $25,000 in six months by cutting clerical work in half, producing invoices on time.

*Names on request.

ONLY COPYFLEX 14—*of all desk-side copying machines—gives you . . .*

1. 20" width! Copies even *large* reports, or two ordinary forms simultaneously. Separates and returns originals automatically.

2. No installation! No fumes, so no exhaust ducts are needed. Thus, the "14" is *mobile*, rolls to any work-site.

3. Copies even opaque originals or forms printed on *both* sides, using Bruning's exclusive Reflex Film!

4. Unequalled combination of speed, volume, low-cost. Copies thousands of large or small, *different* originals daily, at an average cost of only 2¢ per sq. ft.

COPYFLEX 14 makes exact copies . . . delivered in seconds—flat, dry, ready-to-use. There are no masters or stencils, no inks to soil hands, no darkroom, no fumes, no special room lighting, no high-priced operators. Anyone can learn to make copies in 5 minutes.

There's a COPYFLEX machine for every price or print requirement. See how Bruning COPYFLEX can speed your paperwork, give you *better* prints *faster*. Just send in the coupon to the Charles Bruning Co., Inc., Teterboro, N. J.

'COPYFLEX 93 handles cut sheets or roll stock up to 42 in. wide.

BRUNING

Specialists in copying since 1897

Mail Now for full, money-saving COPYFLEX story!

CHARLES BRUNING COMPANY, INC.
Dept. K102, Teterboro, N. J.

☐ Send me free booklet on COPYFLEX 14.
☐ Show me COPYFLEX in action (no obligation).

Name..... Title.....
Company.....
Street.....
City..... State.....

OFFICES IN PRINCIPAL CITIES

Your PROBLEM IS Our JOB

Working with a wide variety of band and power hack saw machines, Milford Specialists continually test MILFORD Blades under both normal and severe break-down conditions. The carefully tabulated results contribute substantially to the development of MILFORD Blades that give you maximum performance in the type of metal you cut. MILFORD Specialists make your metal cutting problems theirs. If necessary, special tests are conducted on your material to make sure you get maximum production at the lowest cost.

STANDARD OF QUALITY THE WORLD OVER

THE HENRY G. THOMPSON & SON CO.

SAW BLADE SPECIALISTS FOR OVER 75 YEARS

NEW HAVEN 5, CONNECTICUT

PROFILE AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

NEW ELECTRICAL EQUIPMENT

Begins on page 184

Circuit Breaker Fits Like a Fuse

You use Mini-Breaker just like a fuse—in any standard Edison-base fuseholder delivering 110-125 volts a-c.

Anyone can install it in a few seconds. And anyone can restore electrical service after an overload or short circuit simply by pressing in and releasing the shock-proof re-set button.

You can get Mini-Breakers in 15-, 20-, and 30-amp. ratings. They're listed by Underwriters' Laboratories, Inc.

Mechanical Products, Inc., Jackson, Mich.

■

Adjustable Wireway Fittings

You can adjust them to fit dimensions that do not conform to standard wireway lengths. And they will save you time, trouble, installation costs, says maker.

The fittings are 16-gauge steel, and are painted for rust resistance. You can get them for 2½-in., 4-in., or 6-in. wireways—and they telescope from 8 to 12 inches. Set screws lock them in place at the desired length.

Keystone Mfg. Co., 23328 Sherwood Rd., Centerline, Mich.

Turn the page

with CLARK Type "CY" COMBINATION AC MOTOR STARTERS

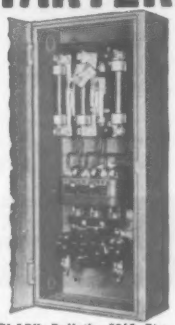
Clark type "CY" Combination Starters offer many cost-saving advantages.

They cut installation costs—only one cabinet to mount.

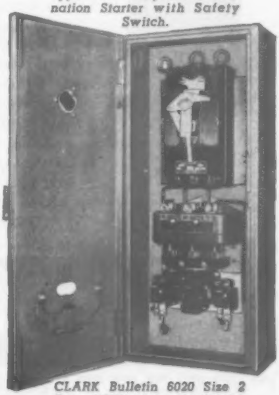
They cut wiring costs—simply connect to power line and run leads to equipment to be controlled.

They simplify inspection and reduce maintenance to a minimum. Moving contacts are inspected by merely pushing down the contact bars—stationary contacts by opening snap-action cover clips and releasing lower arc shield. Because the arcs are magnetically rotated pitting and corrosion of the twin-break silver-alloy contacts are negligible. However, if contacts must be replaced, this can be quickly done with a screw driver and a wrench, without removing starter from cabinet. These, like all other parts, are front removable. And the entire control unit—on baseplate—can be lifted from the cabinet after disconnecting leads and loosening 3 screws.

Type "CY" Combination Starters are designed in many styles, sizes and enclosures. Shown here are Bulletin 6018 combining a fusible or non-fusible safety switch and a size 2 type "CY" starter—and Bulletin 6020 combining a size 2 type "CY" starter and a circuit breaker—all in a single, neat enclosure.



CLARK Bulletin 6018 Size 2 Type "CY" Magnetic Combination Starter with Safety Switch.



CLARK Bulletin 6020 Size 2 Type "CY" Magnetic Combination Motor Starter with Circuit Breaker.

Cut your installation, wiring and maintenance costs with Clark Type "CY" Combination Starters

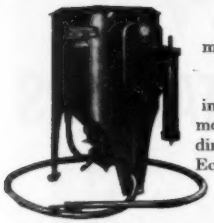
THE CLARK CONTROLLER CO.

ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO

Here's BIG NEWS

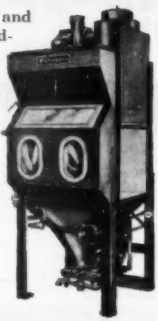
on Blast Cleaning
Dust Control
Precision Finishing

Blast Cleaning Unit is PORTABLE!



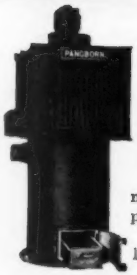
Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from.....$170.00 and up

Hydro-Finish SPEEDS POLISHING!



Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from $1410.00 and up

STOP DUST at the SOURCE!



Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from $286.00 and up

COMPACT Blast Cabinet for SMALL WORK!

Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from $319.00up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

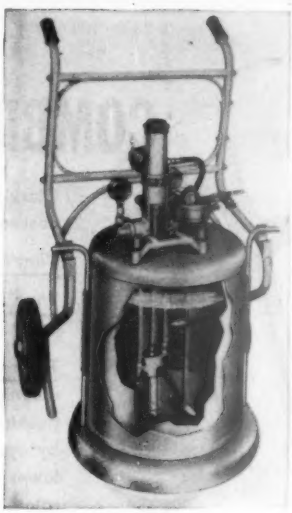
Pangborn MAIL COUPON FOR DETAILS

Check for more information
- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Md.
Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....
Company.....
Address.....
City.....Zone....State.....

MAINTENANCE TOOLS & SUPPLIES



Portable Spray-Gun Supply Pump

You can use it indoors or outside—wherever a paint job is needed. The portable heavy-duty Paintmaster spray-gun supply pump works directly from 5- or 10-gal. original containers.

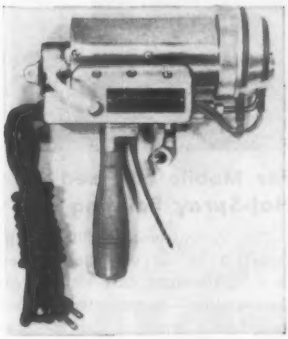
Large rubber tires on the hand truck make it easier to roll over rough areas. And for stationary operation you just detach the truck from the trunnion arms—no bolts or pins to remove or lose.

Materials are kept perfectly mixed by an air-operated, dual-bladed agitator. Because of its unique design, the pump handles many abrasive materials economically. And it is perfect, say the makers, for spraying most of the newer vinyl and plastic base

coatings. For more complete details on operation and applications, write to the manufacturer.

Gray Co., Inc., 1012 Sibley St., Minneapolis 13, Minn.

■



Spray Low-Temperature Alloys and Metals

Spray King was designed to handle those marginal alloys in the 500 F. to 650 F. range that are so hard to spray.

A special nozzle heating element is said to prevent metal from cooling at the nozzle and assure a continuous uniform spray. The gun's capacity is 7 lb. of low-melting alloy.

The Cooper Alloy Foundry Co., Hillside 5, N. J.

■

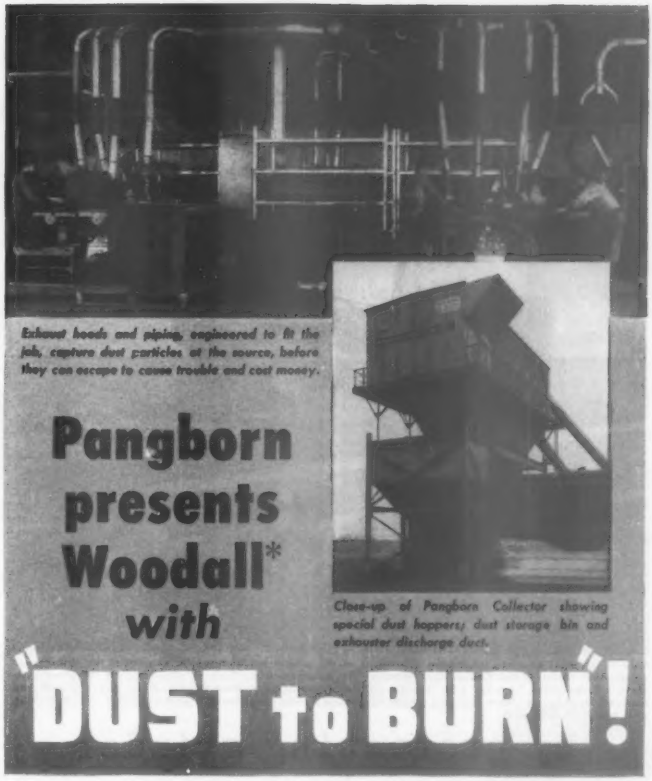
Speedy Belt Dressing

Just spray it on directly from its container while the belts are in motion. Each 12-oz. container of Grako Sprazon can treat about 350 sq. ft. of belt surface.

The atomized dressing is said to penetrate leather faster and deeper than dressings applied by conventional methods. And it's easier to get it where it counts—on the small pulley face where slippage occurs.

Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.

Turn the page


Exhaust hoods and piping, engineered to fit the job, capture dust particles at the source, before they can escape to cause trouble and cost money.
Pangborn presents Woodall* with "DUST to BURN"!
Close-up of Pangborn Collector showing special dust hoppers, dust storage bin and exhauster discharge duct.

How Woodall Industries, Inc., uses Pangborn equipment to save $14,000 per year!

Woodall Industries, Inc., Long Island, N. Y., produces Masonite panels in varying shapes and sizes for the automotive, railroad, television, and refrigeration industries, to name just a few. Shaping and drilling these panels produces Masonite dust—and plenty of it!

Without an effective system of dust control, Woodall workers would soon be knee-deep in dust. Thus, the Pangborn Dust Control System installed at Woodall would be essential at any cost. The beauty of the system, however, is that it *doesn't cost at all*—but actually pays its own way, with a nice profit to boot!

That's because this Pangborn Dust Control System not only maintains a dust-free plant, but also provides *all* the fuel for all heating and processing requirements, by conveying the Masonite dust from its source to a boiler furnace. Savings in oil alone have been figured at about $14,000 a year!

Add to this the savings in "housekeeping" costs, benefits in improved health and morale of employees—and you can see why Woodall is so enthusiastic about their Pangborn Dust Control System.

What are your Dust Problems? Find out what Pangborn can do to solve them. Write today for Bulletin 909A. Address: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits

One of the most exacting machining operations in the production of turbo-jet engines is the grinding of compressor rotors in the Kansas City plant of the Aviation-Gas Turbine Division of Westinghouse Electric Corporation. Two 24" x 96" Norton cylindrical grinders are mounted, as shown above, directly on Korfund Steel Spring Vibro-Isolators without the usual massive foundations. These grinders are 19' 6" long and weigh 27,200# each.

...by protecting grinder accuracy against external vibration

Extremely close tolerances required for compressor rotors made it necessary for Westinghouse to isolate their cylindrical grinders from heavy external truck vibration.

Conventional foundations would have required an excavation through the existing floor 7 ft. wide by 22 ft. long by 4½ ft. deep—with over 20 cubic yards of concrete weighing approximately 80,000 lbs.—for each grinder.

In contrast to this, Korfund Steel Spring Isolators permitted installation of the grinders directly on the existing concrete floor after simply removing the wood block to help reduce the height of the installation.

Tests made after the installation was completed—in which the isolators were "short circuited" out—demonstrated that it would have been impossible to do accurate work on the grinder without Korfund Vibration Control. Rigid alignment of work and grinding head is maintained, as proven by the fact that during the first two years of operation, no adjustments have been required.

Korfund Isolators more than paid for themselves in reduced foundation costs alone.

If you would like more information on how Korfund Vibration Control can save you money and increase production, write for your free copy of "Steel-Spring-Type Vibration Mountings for Machine Tools." Also, a selector chart in Bulletin G-104 gives recommendations for both normal and critical installations—for machine tools, presses, hammers, pumps, compressors and most other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-35C Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 192

For Mobile or Fixed Hot-Spray Painting

The Pressurematic 300 weighs about 5 lb. It can be carried in a lightweight case slung over the shoulder—or mounted on your spraybooth bench or wall for conveyor-belt applications.

It has no moving parts. The heated material is pushed through the heat exchanger by normal fluid pressure on the spraying line. P-300 can be cleaned without removal from the line, with the normal flushback of the material hose. Or it can be completely disassembled in less than 2 minutes for routine maintenance.

The Spee-Flo Co., 3603 Harrisburg Blvd., Houston, Tex.

■

NEW FLOORING MATERIAL will resist damage from chemicals, many acids, and solvents, according to United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12. Latex-O-Crete can be applied directly over the old surface at an average depth of only ¼ inch. And no special floor preparation is needed other than cleaning, the makers say. The product contains no asphalt or other bituminous substances. It is said to be strong enough to withstand considerable heavy traffic from materials handling equipment. All ingredients are proportioned at the factory. No other materials need be added.

Turn the page

STOP RUST! with RUST-OLEUM®

The Practical Coating!
Beautifies As It Protects!
In All Colors, Aluminum and White!

Cut maintenance costs. Apply RUST-OLEUM directly over rusted surfaces without removing all the rust! Just wirebrush and use sharp scrapers to remove rust scale and loose particles, then apply by brush, dip, or spray. Costly sandblasting and chemical precleaning are not usually required. Specify RUST-OLEUM for every rustable metal surface. Prompt delivery from Industrial Distributors in principal cities.

RUST-OLEUM CORPORATION
2455 Oakton Street, Evanston, Illinois

FREE SURVEY: A RUST-OLEUM specialist will gladly survey your rust problems. He'll make specific tests and recommendations. No cost or obligation. See Sweets for complete catalog and nearest RUST-OLEUM distributor, or write for literature on your company letterhead.

Protects Tanks, Girders Fences, Stacks, Metal Sash, Roofs, Buildings, Marine and Railroad Facilities

Stopping Rust with RUST-OLEUM 769 D.P. Red Primer

Look for this label. Be sure it's genuine RUST-OLEUM!

CLIP THIS TO YOUR LETTERHEAD
MAIL TO: RUST-OLEUM CORPORATION
2455 Oakton Street • Evanston, Illinois

- ☐ Have a Qualified Representative Call
- ☐ Full Details on Free Survey
- ☐ Complete Literature
- ☐ Nearest RUST-OLEUM Source

✱ HERE THEY ARE

The NEW and IMPROVED COMETS!

✱ PUSH BUTTON CONTROL

✱ PENDANT ROPE CONTROL

CM COMET ELECTRIC CHAIN HOISTS

Capacities: ¼ to 2 tons

Plug in on 110 single phase or 220-440 volt power lines

✱ CM COMET Electric Chain Hoists are now available in two models . . . Push Button Control or Pendant Rope Control. Designed for production line applications. Anyone can operate. One hand control, fast load spotting, flexible Herc-Alloy steel load chain, upper and lower safety limits, low power consumption, lifetime lubrication and fully enclosed working parts are just a few COMET advantages.

✱ The faster, more efficient overhead handling of materials and parts with CM COMET Hoists is an immediate way to increase output and reduce unit production costs. Workers' energy is conserved for full day maximum efficiency. Floor space is saved. Production moves smoothly.

COMET CATALOG NO. 150... 18 pages of illustrated hoist information...sent on request. Prices will be included. Write now!

CM DISTRIBUTORS ARE LOCATED IN ALL INDUSTRIAL CENTERS

CHISHOLM-MOORE HOIST CORPORATION

(Division of Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 192

Plastic Seal for Vacuum Lines

Plastic Gasket may be the answer to your vacuum-line sealing problems. Maker says that a 1/64-in. coating on flange faces and gasket surfaces will do the trick.

Any slight leakage can be corrected without dismantling. Just apply Plastic Gasket around the outside surfaces of the flange where they meet with the gasket. Material never hardens, so flanges can be dismantled easily after years of service.

Flexrock Co., 3617 Gilbert St., Philadelphia 4.

■

Versatile Hip-Pocket Torch

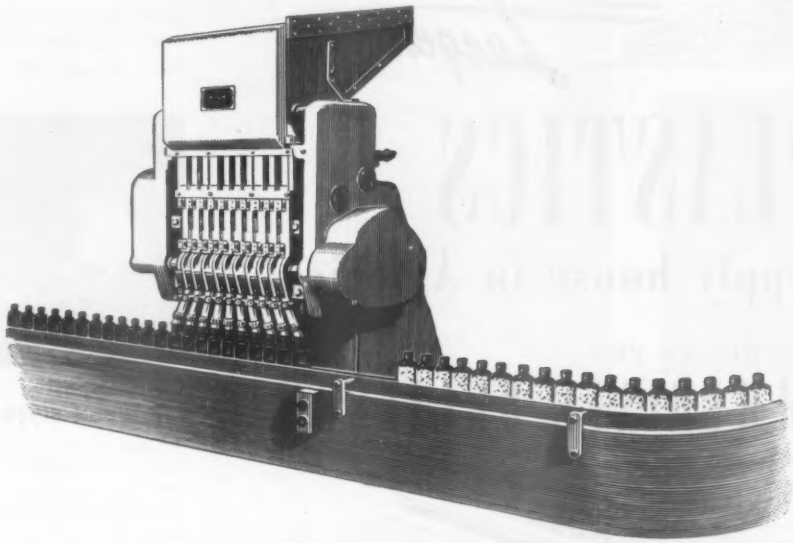
This handy, all-purpose torch is said to light instantly without pre-heating or priming. And it will burn about 15 hours on a replaceable cylinder of liquefied petroleum gas. You have a choice of interchangeable burners—utility or pencil type.

A simple turn of the valve and the torch is in operation. The flame can be adjusted from pinpoint to 8 in. by turning the valve. And it burns at 2300 F. in any position.

Bernz-O-Matic is 10 in. long, has a diameter of 2¾ in., and weighs 2¾ lb. Storage of fuel is ICC and insurance approved.

The Otto Bernz Co., Inc., Rochester, N. Y.

Turn the page



How MODERN REFRIGERATION serves the pharmaceutical industry

CAN IT HELP YOU TOO?

As in many industries, pharmaceutical production demands rigid control of temperature and humidity in almost every operation from experimental laboratory to finished product. Without such control, it is doubtful that many of today's wonder drugs could be made at all.

Ingredients handled are so sensitive that even the slightest changes affect their behavior. For example: production suffered within an hour after a recent enforced shutdown of the air conditioning system in a well-known plant. In some operations, batch scales create toxic dust, gas and vapors. These must be drawn off by ventilators. Materials placed in kettles are heated, agitated, cooled. Others are subjected to treatment in quick-freezing chambers at 40°F. below zero. And throughout every intricate step, temperature and humidity are held constant through the use of modern refrigeration.

Look into air conditioning and refrigeration. Both have countless industrial applications that help step up production . . . lower costs . . . maintain quality . . . prevent errors . . . boost morale . . . increase profits. Your engineers may have several practical suggestions right now. Discuss the subject with them. And when the time comes to choose equipment . . . consider the merits of machines operated with "Freon" refrigerants. These refrigerants are safe . . . nonflammable, nonexplosive, virtually nontoxic, and their purity also insures economical performance of the system over a long period of time.

For additional information on how refrigeration may help you, write for booklet: "How Air Conditioning and Refrigeration Benefit Industry." E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Division, Wilmington 98, Delaware.

"FREON" SAFE REFRIGERANTS

DU PONT
REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

KINETIC
REG. U.S. PAT. OFF.

"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants.

PLASTICS

supply house in America

guarantees you

IMMEDIATE DELIVERY

Our facilities for warehousing enables us to supply you with plastics for all your needs . . . quickly, economically! 1st and 2nd grade inventories and prices upon request.

Whatever your requirements

- PLEXIGLAS
- VINYLITE
- LUCITE
- ACETATE

We can furnish them

cadillac plastic company

15111 SECOND BLVD., Detroit 3, Michigan
Chicago Warehouse: 806 W. Jackson Blvd.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 192

Cold Adhesive for Wood Block Floors

Blockset is applied without heating—eliminates all danger from fire and fumes. It will seal your block floors tightly and form a smooth surface which withstands the heaviest traffic, the makers say.

It is described as drying quickly. And, when dusted over with silica sand, can be trucked over immediately.

Monroe Co., Inc., 10703 Quebec Ave., Cleveland 6.

■

Floor Grinding Attachment

The American Deluxe floor maintenance machine becomes a portable floor grinder with this attachment. Three carborundum grinding stones are equally spaced and fastened to rotate individually on precision-built planetary discs which are a part of a rugged cast-iron frame. It will refinish, grind, polish, or resurface terrazzo floors. And it can smooth out rough, uneven concrete or brick surfaces, says maker.

American Floor Surfacing Machine Co., Toledo, Ohio.

Turn the page

A century of achievement

Studebaker's big, modern South Bend plant symbolizes the century of growth and achievement which have earned for this company an enviable reputation for high quality products and world-wide recognition as America's fourth largest manufacturer of automobiles.

How Standard's lubrication service works for Studebaker

● Look almost anywhere in Studebaker's vast plant at South Bend, Indiana, and you'll see Standard's lubrication service at work.

In one of the many operating departments, the chances are you'll find the Standard lubrication specialist who serves Studebaker. He is assigned to the South Bend area and is close-at-hand to give Studebaker the lubrication engineering assistance they need when they need it.

Almost any day at Studebaker's, you'll see a Standard tank wagon or truck delivering the petroleum products that help keep production rolling. Because these deliveries are made from a nearby Standard warehouse, they are prompt and reliable. Most of the petroleum products used in the Studebaker plant are stocked in this warehouse and are immediately available.

All along Studebaker's assembly and production lines, you'll find Standard Oil products at work. From one of the most complete lines of fuels and lubricants on the market, Studebaker has been able to select the petroleum products that exactly fit its needs.

All of these benefits—expert engineering service, fast and reliable deliveries, a complete line of high quality products—add up to one of the reasons why Studebaker has been a Standard Oil customer for over 50 years. Make Studebaker's experience the basis for putting Standard's lubrication service to work for you. Just phone your local Standard Oil (Ind.) office and ask to have the Standard Oil lubrication specialist in your area call on you.

What's YOUR problem?

Russ Jenkins (left), lubrication specialist from Standard's South Bend office, and Studebaker's Paul Izdepski work closely together to get best results from Standard's fuels and lubricants.

Wherever your plant is situated in the Midwest, there is a Standard lubrication specialist close-at-hand who will work hand-in-hand with you on lubrication problems. Right in your neighborhood, too, you'll find a Standard office and warehouse. It makes immediately available to you a reliable supply of petroleum products. Phone your local Standard office soon, and find how you can profit through Standard's unique industrial lubrication service.

STANOBAR Grease is used throughout the Studebaker plant for lubrication of bearings in electric motors and oil pumps. Its high stability enables it to provide effective lubrication under a wide variety of operating conditions.

STANWAY Industrial Oil. In many of Studebaker's grinding machines, STANWAY Industrial Oil No. 30H answers a special need by serving both as a hydraulic oil and as a lubricant for ways and guides. The high stability necessary in a hydraulic oil and the oiliness needed in a way lubricant are uniquely combined in STANWAY.

STANDARD OIL COMPANY STANDARD (*Indiana*)

switchgear
(drawout or stationary)

"Concentrol" motor control centers

panelboards

feeder & plug-in bus duct

unit substations

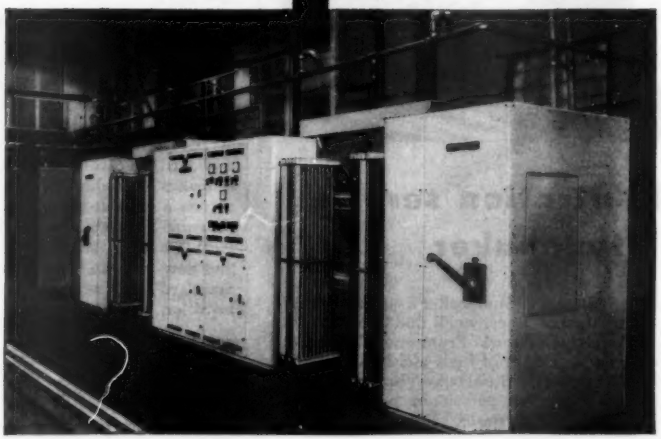
instrument panels

"Weather-Loc" enclosures

theater switchboards

wireway

• • • the modern, low-cost "packaged" method of supplying power. This Continental installation is a 3000 KVA Double Ended Unit. With Continental equipment, you can coordinate your complete electrical distribution system. And, Continental craftsmanship gives you top performance and appearance value.



DATA ON INSTALLATION PICTURED
High voltage sections: Load Break Air Interrupter Switches.
Transformers: Askarel Immersed, 1500 KVA, 3-Phase, 12,000-480 V.
Switchgear: 600 V., Drawout Type Air Circuit Breakers.
Bus Duct: Continental Low Impedance Feeder Bus Duct.

Before you decide on any Electrical Distribution Equipment, be sure you have Continental's engineered proposals and delivery schedules! Your inquiries will be given prompt attention . . . and Continental's standardized equipment will get you into action . . . fast!

CONTINENTAL
ELECTRIC EQUIPMENT CO.
BOX 1055-F, CINCINNATI 1, OHIO

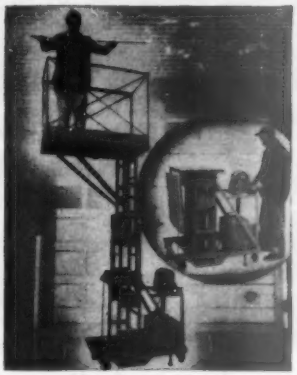
. . . manufacturers of one of the most complete lines of Electrical Distribution Equipment

Send for literature and standards

Specify Continental . . . with Confidence!

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 192



Gives You a Lift

Overhead maintenance jobs are made easier by the Hi-Lift Midget. The entire unit comes in one piece.

No erection is required. And you can reach a height of 15 ft. for painting, lighting, cleaning, etc. Base measures 27x40 inches.

There are no loose parts. It is of sturdy all-welded steel construction.

Atlas Industrial Corp., 849 39th St., Brooklyn, N. Y.

■

Five-in-One Air-Acetylene Outfit

The full capacities of five separate outfits for soldering, heating, and light brazing are combined in one kit by Prest-O-Lite. Four open-flame torch stems and a pointed copper soldering iron attach interchangeably to a newly designed precision control handle.

Linde Air Products Co., 30 E. 42nd St., New York 17.

Turn the page

AUTOMATIC MIXER TAMES HOT WATER

Sylphon Hot-Cold Water Mixer No. 902. Sizes with capacities ranging from 5 to 131 gallons per minute.

Keeps Process Temperature Constant!

THIS SYLPHON Hot-Cold Water Mixer can "take over" the job of supplying constant temperature process water—relieve you of all worries! It's one of the best helps for bakeries . . . dairies . . . packing houses . . . candy factories and other operations where water temperature must be maintained *accurately*. Ideal also for gang showers, wash fountains, etc.

See how simply and dependably this Sylphon Mixer works. It uses hot water from any storage tank or instantaneous heater. It regulates the amount of cold water required to temper it to the desired degree. It actually mixes water together before delivery. And even if the supply water temperature or pressure fluctuates—temperature remains constant.

And think of this extra advantage! If either hot or cold water supply fails, the Sylphon Mixer immediately shuts off the remaining supply. When supply is returned, the Mixer starts operating again.

Sylphon Hot-Cold Water Mixers are self-contained, self-powered, compact and ruggedly built. Serve economically for years. Adjustable temperature range. For complete information, write Dept. TF.

FS

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON

DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

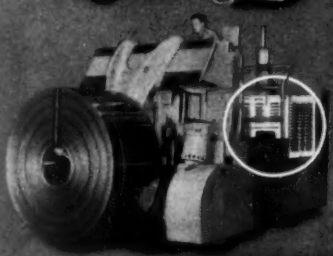
Canadian Representatives, Darling Brothers, Montreal

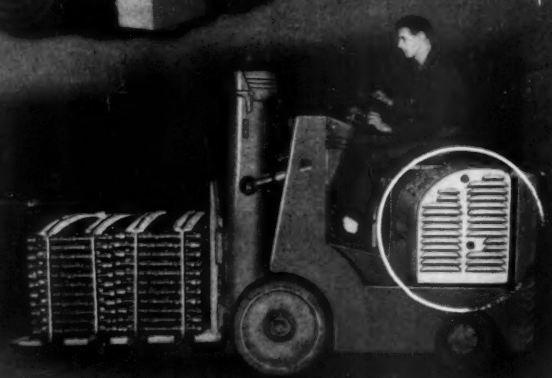
ARE YOUR ELECTRIC TRUCKS GUILTY OF "4 O'clock Letdown?"

READY-POWER DRIVE

for Full Efficiency ALL THE TIME!

Only Ready-Power gives your electric trucks full efficiency for every minute of every hour . . . all day long. And because Ready-Power-equipped trucks are so easy to operate, drivers are more efficient, too. Unlimited power plus alert drivers add up to more ton-miles per hour.





Remember . . . Your Truck Is No Better Than Its Power

CONTINUOUS-DUTY POWER UNITS

The READY-POWER Co.

3820 Grand River Ave., Detroit 8, Michigan

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

MATERIALS HANDLING

YOU CAN get more flexibility and . . .

. . . faster car loading with a . . .

Hydraulic Dock Ramp

Just push an electric button, and this hydraulic ramp will reach out for the freight-car door.

In retracted position, the ramp is flush with the top and front edge of the dock—important during switching operations.

A secondary, or auxiliary ramp, moves outward from under the main ramp. And it will run out 4 ft., and up and down 2 ft.

The ramp is said to provide easy entrance into the freight car for all types of materials handling trucks.

It comes in two widths—42-in. and 5-ft. The standard unit has a roll-over capacity of 12,000 lb.

Beacon Machinery, Inc., East St. Louis, Ill.

Turn the page

TWO BIG EXTRAS
you get in
COFFING HOISTS

EXTRA SAFETY

You can depend on Coffing Hoists to fully protect men and equipment. Each is guaranteed to work at full-rated capacity — with an extra margin of safety. Load can't slip or drop. All load-holding parts are factory-tested at 100 percent overload. Specially designed hooks are heat-treated alloy steel — will not break or straighten out.

LOW-COST MAINTENANCE

Heavy-duty construction throughout keeps Coffing Hoists *on the job* — assures longer life, less maintenance. Gears are drop-forged alloy steel, hard-faced for extra wear, soft-cored for added strength. Moving parts run in oil bath and on heavy sealed ball bearings. These and many other construction extras are your assurance that Coffing Hoists will keep working even in hardest continual production line use.

Coffing Quik-Lift Electric Hoists
Seventeen models — capacities from 500 to 4,000 lb.

Coffing Safety-Pull Ratchet Lever Hoists
Ten models — capacities from 1,500 lb. to 15 tons.

For more information on Quik-Lifts, Safety-Pulls and other Coffing products listed below, write Dept M10.

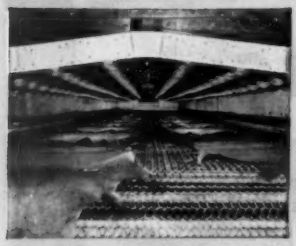
Hoist-Alls • Mighty-Midget Pullers • Spur-Gear Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

SOLD BY DISTRIBUTORS EVERYWHERE

COFFING HOIST COMPANY
Danville, Illinois

FOR BAKING • DRYING • DEGREASING • DEHYDRATING • PREHEATING

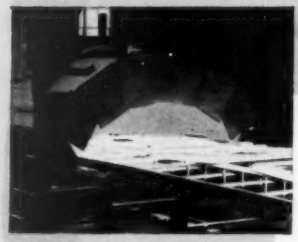
GIVE YOUR PLANT
THE COST SAVINGS OF FOSTORIA INFRA-RED



Leather Drying

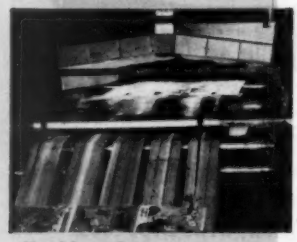
This Fostoria oven at Wm. Amer. Co., Philadelphia, eliminated eleven workers. Dyes, water soluable lacquers and pigmented coatings are dried in approximately one minute.

Everywhere, industry is cutting costs, speeding production, saving floor space, saving manhours by modernizing with Fostoria Infra-red ovens. No other heating process is so highly efficient, so amazingly fast, so easily controlled. Like the sun, Infra-red lamps radiate energy which creates heat instantly *when directed upon any object.* Fostoria Gold-lined. Evenray oven walls are the vital key which *directs, reflects and redirects* these Infra-red rays *uniformly* with the *highest productive utilization of energy.* Only Fostoria has Golden Wall — Evenray reflection. No other equipment approaches the low "per-piece" production cost and quality obtained with a Fostoria oven. Write for full facts, today!



Porcelain (Slip) Enamel

Dried in less than one minute before high temperature firing. Photo shows one of two Fostoria ovens used at Athens Stove Works, Athens, Tenn.



Varnish on Paper

Dried in 3 to 5 seconds with Fostoria oven at Stevens Printing, Sandusky, Ohio. Other clear coatings also dried quickly, improving appearance and saving space.

ASK US FOR MORE INFORMATION ON ANY OF THESE APPLICATIONS

BAKING
- ☐ Paint prime and finish
- ☐ Electrical insulation

DRYING
- ☐ Metal product baths
- ☐ Special coats on metal, wood, paper, fabrics, leather and plastics
- ☐ Wet electric equipment
- ☐ Plastic powders
- ☐ Silk screened products
- ☐ Ink
- ☐ Sand cores and molds
- ☐ Varnished paper
- ☐ Glue and adhesives

DEGREASING
- ☐ Metal Products

DEHYDRATING
- ☐ Textile-fabric, yarn and thread
- ☐ Paper
- ☐ Leather
- ☐ Pottery
- ☐ Frit
- ☐ Pulverized animal food

PREHEATING
- ☐ Metal products to secure shrink fit
- ☐ Fibre, metal for easier punching and shearing
- ☐ Glass closures to fill without breaking
- ☐ Syrups, grease, oil, etc. to facilitate flow
- ☐ Plastics before forming
- ☐ Metal prior to welding

MISCELLANEOUS
- ☐ Soldering
- ☐ Cooking, baking and brazing foods
- ☐ Carbonizing woolens
- ☐ Comfort heating
- ☐ Sanforizing
- ☐ Precipitation silver nitrate in making mirrors
- ☐ Curing rubber, latex
- ☐ Setting flocked items
- ☐ Seal storage batteries

INFRA-RED fostoria SYSTEM

THE FOSTORIA PRESSED STEEL CORP.
FOSTORIA, OHIO, Dept. F

Please send me information on Infra-red Ovens for .....

Name .....

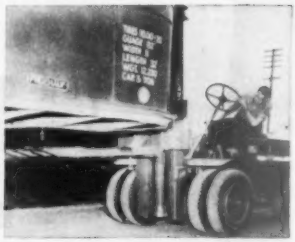
Company .....

Street .....

City ..... State .....

MATERIALS HANDLING EQUIPMENT

Begins on page 202



Fork Lift Attachment Spots Semi-Trailers

Have you ever wanted to move a semi-trailer when a tractor wasn't available?

Now you can avoid such costly delays if you have a 6000- to 10,000-lb. fork truck handy, say the Clark people.

Just slip the attachment over the forks and secure it with a chain. The driver merely moves up to the end of the trailer until the engaging plate is directly under the pin.

As the forks and the attachment lift, the plate engages the pin and the trailer is lifted. It can be pushed or pulled to the desired location.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

■

Roll Your Pallets

The Ace Stevedore King is a 3-ft. square welded steel frame with rollers. You can place an empty pallet on the frame, load it, and roll it in either direction—forward or backward.

Stevedore King can pinch-hit for your tied-up or frozen fork trucks and eliminate costly delays in materials handling.

Rollers are heavy-gage steel and have crowned ends for free rolling and floor protection. Bearings are heavy duty, fully lubricated. Hexagonal axles can't turn.

Frank L. Robinson Co., Latham Sq. Bldg., Oakland 12, Calif.

Turn the page

Now . . . 2 New
AO COVERGLAS GOGGLES
Fit Over Safety And Personal Glasses

NEW
Safety Goggles

#326

#327

NEW — 4 WAYS!

1. New Cup Size and Shape
2. New Lens Size and Shape
3. New Side Shields
4. New Easy Lens Replacement

AO's newest development in eye protection—Chippers' and Welders' Coverglas Goggles—can be worn over practically every pair of personal glasses (even the biggest frames) and most types of safety prescription goggles *with and without side shield.*

Wider vision, too, because the lenses are larger and scientifically designed to give up to 20% more vision. Yet, with all these features the goggles weigh but a fraction of an ounce more than ordinary Coverglas goggles . . . cost only slightly more.

These goggles are the newest . . . and two of the greatest . . . developments since the advent of safety goggles. Get all the facts about these two outstanding Coverglas goggles from your AO Safety Products Representative. He can supply you.

QUICK FACTS

- Lens easily replaceable from rear (not front) by means of a spring clamp—no tools needed
- Lightweight, brown plastic cups fit face snugly, won't conduct heat or electricity
- Light-tight side shields for welders (on No. 327 goggle) provide indirect ventilation
- Bridge—High-grade leather. Instant adjustment
- AO worker-lab tests show much greater field of vision and increased comfort
- All-rubber headband, easily adjustable

"326" Chippers' Coverglas goggle supplied with regular Super Armorplate lenses. "327" Welders' Coverglas goggle supplied with regular Noviweld lenses and cover lenses.

AO's Industrial Vision Program Increases Production, Decreases Accidents. Write today for booklet "Improved Industrial Vision" to 1011 Vision Park, Southbridge, Mass.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

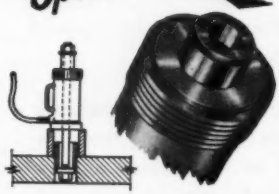
Simplifies PULLING!

LESS RIGGING NEEDED! LESS SET-UP TIME! SAVE THE TOOL COST ON ONE JOB!

The New SIMPLEX Re-Mo-Trol Hydraulic Pumps and Remote Controlled Rams "Center-Hole"* PULLERS

The only remote control puller offering this time and work saving advantage! Just insert a pull rod or screw through the tubular ram and secure it to the object to be pulled. Rod is drawn through ram as plunger extends, in a direct-line pull. No complicated rigging. Ram is its own back-up. Sketch shows typical use removing sleeve.

Exclusive "Center-Hole" Speeds the Job!



PUMPS AND RAMS *Interchangeable*

Two pumps—seven rams. Smaller pump handles all Rams up to 30 tons capacity, larger pump handles any Re-Mo-Trol Ram. You can buy only the units you actually need!

If it can be pulled, Re-Mo-Trol can pull it easier! Pulls gears—wheels—pinions—axles—shafts—sleeves—liners—studs. Operates as shown with center pulling screw, or pull rods and bracket. Or use it for any kind of conventional lifting or pressing job. Seven complete units—10 to 100 tons capacity.

*On Rams of 30-tons or greater capacity

Simplex LEVER • SCREW • HYDRAULIC Jacks

Write for Bulletin: Hydraulic 51 for full information

TEMPLETON, KENLY & CO. • 1018 South Central Avenue, Chicago 44, Illinois

MATERIALS HANDLING EQUIPMENT

Begins on page 202

To Move and Dip Small Parts

You can now get a steel mesh basket shaped like the original NesTier box.

It is designed for efficient handling and space saving where small parts are being moved and dipped in chemicals, paints, and other liquids.

You can nest it or tier it by flipping up handles at either end. Grooves on bottom give self-centered stack rigidity.

Charles W. Doepke Mfg. Co. Inc., Rossmoyne, Ohio.

■

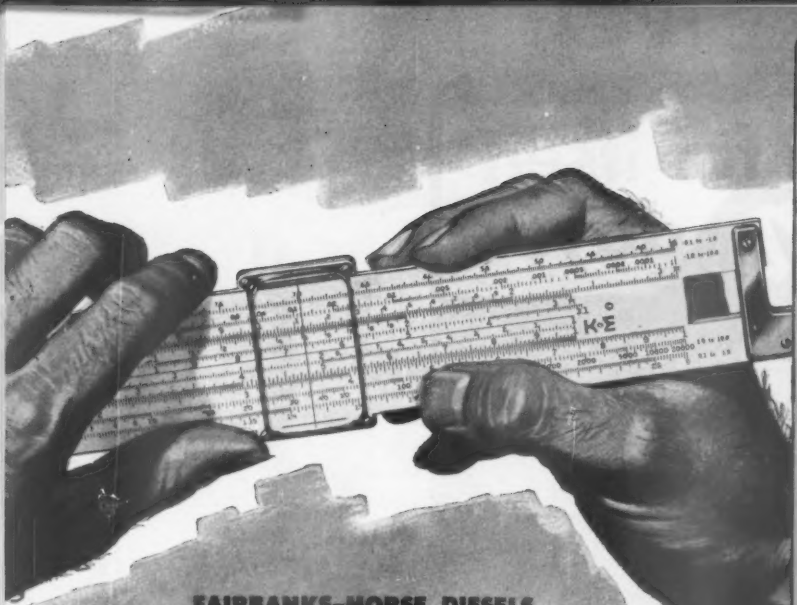
Plastic Tote Boxes

The copolymer sheeting from which Tew-Roe-Totes are made is said to give unusual strength, lightness, and resistance to common acids, oils, and greases.

Boxes are also chip-proof, corrosion-proof, and won't warp, says the maker. And they're easy to clean. You can get these boxes in a serviceable range of sizes

Tewes-Roedel Plastics Corp., Waukesha, Wis.

Turn the page



FAIRBANKS-MORSE DIESELS
CAN HELP SOLVE YOUR

Power Equation

Balancing the many elements of power requirements—against cost—is a major problem facing all manufacturers today. Failure to solve this complex equation can mean the difference between profit and loss.

But, is there a solution in *Your* Plant?

Look at this partial list of Fairbanks-Morse Diesel advantages and see. F-M in-plant power economically adds to current capacity as load increases . . . eliminates purchasing power at rates based on high peak demand values. Improved power factor. Better current characteristics. Flexibility. Economy. These are a few of the factors that can put your power equation in balance.

If you want the answer to your power equation, write us today outlining your needs. Fairbanks-Morse engineering can give you a proved answer . . . based on over 50 years' experience in industrial and municipal power generation. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • PUMPS • SCALES • RAIL CARS • MAGNETOS • FARM MACHINERY

Put Your Power Costs and Performance in Order

1 *Handle Peak Demand* . . . reduce peak demand values for lower purchased power cost.

2 *Raise Power Factor* . . . "in-plant" generator can eliminate power factor penalties.

3 *Emergency Power* . . . insurance against lost production, damage due to line failures.

4 *Handle Surge Loads* . . . that may now be affecting current characteristics of entire plant.

5 *Plant Expansion* . . . need not be restricted due to lack—or expense—of ample power.

6 *Useful Heat* . . . lube oil, water and exhaust heat can cut drying and heating costs.

7 *Chemical Value* . . . exhaust gases are high in nitrogen—available for economical fixation of nitrates, ammonia.

8 *Insurance Advantage* . . . of diesel over gasoline engine, for example, will soon pay for installation.

9 *No Weather Worries* . . . ice, snow, sleet, wind storms can't stop plant operations.

10 *Handle Increasing Load* . . . "in-plant" power economically adds to current capacity as load increases.

11 *Fuel Economy* . . . use diesel oil, natural gas or sewage gas for added economy.

12 *Remote Locations* . . . distance from transmission lines needn't curtail planned plant expansions.

13 *Compact Power* . . . Fairbanks-Morse engines give you, more power per foot of floor space, more power on present foundation.

14 *Minimum Attendance* . . . Fairbanks-Morse "in-plant" generating sets require minimum supervision and maintenance.

15 *Save Cost* . . . of running in new line where present transformers and power lines are already loaded.

it paid for itself in 22 days

THIS IS ONE OF 6 Tennant Sweepers used at Caterpillar. The first was bought 3 years ago.

TENNANT POWER SWEEPER

THIS fast, heavy-duty TENNANT Power Sweeper cost $1985*... yet saved enough in manhours at Caterpillar Tractor Co. (Peoria) to pay for itself in 22 days.

These results were obtained in the Parts Department, where 12 men formerly swept aisles with push brooms. The saving, confirmed by time studies, amounted to more than 80 manhours per day.

CUTS COSTS IN MANY PLANTS

● **U.S. RUBBER** estimates mechanized sweeping can save up to $12,000 annually per machine. (They have 3 Tennant sweepers.)

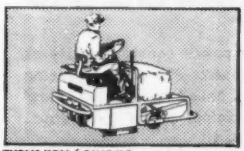
● **PAN AMERICAN** Airlines save approximately 75% in manhours by sweeping their warehouse floors in Miami with a Tennant Model 36 Power Sweeper.

● **WHITIN MACHINE** report making a net saving of several thousands of dollars in 10 months with a Tennant Power Sweeper.

*Smaller models available.

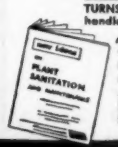
LET US ESTIMATE savings possible in your plant through mechanized sweeping. No obligation. Phone, wire or write!

SWEEPS CLEAN AT HIGH SPEED as 36" brush spins inside "sealed-to-floor" compartment. 11" fan controls dust. Removable hopper.



TURNS "ON A DIME." Easy-steering; easy to handle. Forward or reverse on single pedal.

G. H. TENNANT CO.
2554 North Second Street
Minneapolis 11, Minn.



Write for illustrated bulletins and performance data; specify 36" or 24" sweepers. Also get FREE 16-page booklet, "New Ideas on Plant Sanitation & Maintenance."

INDUSTRIAL FLOOR MACHINES

CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE · MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS
OFFICES IN PRINCIPAL CITIES

MATERIALS HANDLING EQUIPMENT

Begins on page 202

For Crowded Storage Areas

You can navigate aisles only 6 feet wide—and stack materials 11 feet high—with the new Transveyor. This electric lift can handle 2500-lb., 48-in. loads.

It has two mast heights—68 and 83 inches. The manufacturer claims the suspension system equalizes load on both front wheels regardless of floor conditions.

Automatic Transportation Co., 149 W. 87th St., Chicago 20.

■

NEW INDUSTRIAL CASTER — for trailer-truck service—is offered by the Midwest Precision Corp., Jackson, Mich. Loadmaster features a new Timken roller bearing. The maker claims that the greater diameter of the bearing offers more resistance to thrust and torque.

■

ROLL-FREE GRAVITY CONVEYORS have rollers and wheels entirely protected from corrosion, says A. B. Farquhar Co., Div. of Oliver Corp., York, Pa. They are treated by a process that impregnates every bearing and contact surface with a lasting lubricant.

Turn the page

PRE-TESTED...GUARANTEED...FULL-RATED AIR POWER!

WAYNE

JOB-ENGINEERED COMPRESSORS

You get all you pay for in a Wayne Compressor. Every one is sold on the basis of known efficiency in terms of useable air output—pre-tested and guaranteed. Designed, engineered and built in Wayne plants each compressor is "job-engineered," you are assured of buying guaranteed air output for a specific job.

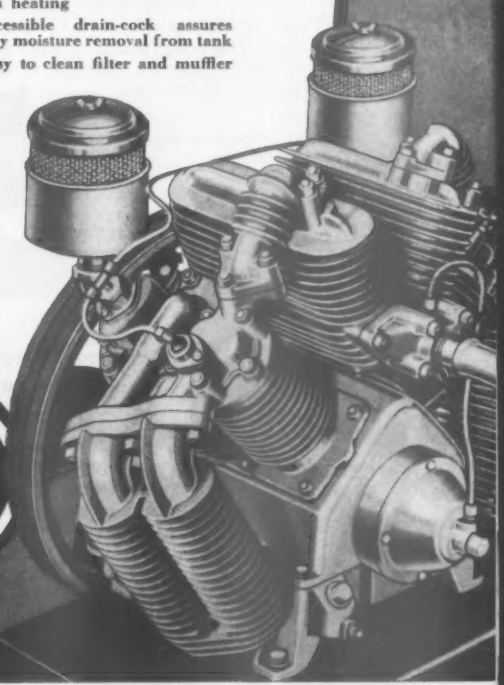
Wayne Air Compressors are checked for volumetric efficiency, performance and operating tolerances. Inspection standards are high, and units must measure up to rigid requirements. Every working part has been designed for minimum maintenance and low operating cost.

You get every dollar's worth with a Wayne — highest quality, guaranteed air output, nationwide service. Make your next air compressor a Wayne!

ENGINEERED 10 WAYS BETTER!

1. Larger aircooling flywheel
2. Extra cooling fins on cylinder blocks
3. Easily cleaned intercooler
4. Dual intake valves
5. Positive lubrication system
6. Dual moisture extractors
7. Counter-balanced flywheel . . . smoother operation
8. Automotive type pistons . . . less heating
9. Accessible drain-cock assures easy moisture removal from tank
10. Easy to clean filter and muffler

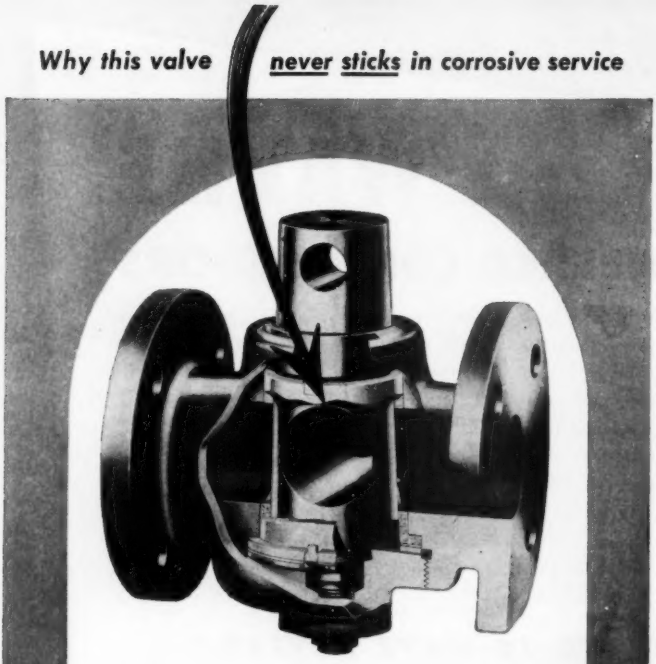
THE WAYNE PUMP CO.
SALISBURY • TORONTO
MARYLAND • CANADA



Wayne
NATION WIDE SERVICE

INDUSTRIAL LIFTS • HOSE REELS • AIR COMPRESSORS

Why this valve ***never sticks*** *in corrosive service*



DURCO TYPE F VALVE

No metal-to-metal contact. The Teflon sleeve completely separates the plug from the body of the valve. This eliminates the need for any lubricant. The design which includes many other features desirable for corrosive service is discussed fully in Bulletin 647.

Write for free Bulletin 647

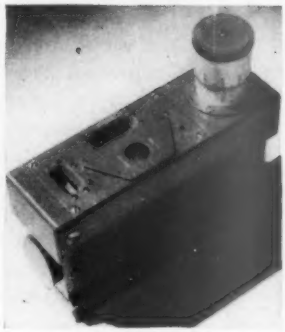
Standard Durco equipment solves specialized corrosion problems

For more than 40 years Durco has provided the answers to specialized corrosion problems — often before industry asked for the answers. The resulting equipment now comprises the standard Durco product line. If you have a tough corrosion problem, the Durco representative near you is ready to help.

DURCO CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY, Inc.
Dayton, Ohio

MEASURING & CONTROL



Optical Level

New optical level gives you deviations from the horizontal of 0.00012-in. per foot of length or 0.00001-in. per inch of length. Maker says it's accurate enough to check flatness of surface plates and machine tool beds, straightness of cylindrical rolls, and the parallelism of V-ways or flats to within the closest tolerances.

F. T. Griswold Mfg. Co., W. Lancaster Ave., Wayne, Pa.

■

Measuring Microscope

Optometer is about as big as a fountain pen and is carried just as easily. An engraved scale mounted in the tube lets you read directly to 0.002 inch.

Precision, achromatic lenses—50 power—are fully corrected for color and give a sharp image to the edge of the field of vision.

National Instrument Co., 5005 Queensbury Ave., Baltimore.

Turn the page

DRAW-OUT TYPE AIR CIRCUIT BREAKER pulls out for inspection—can be easily replaced with a spare if maintenance is required. Modern metal enclosed units with no exposed live parts provide maximum safety.

Order by number—

save weeks on delivery

Look at the catalog, pick out the ratings for the number of feeders you require, and just order by number! That's all you have to do to get modern G-E low-voltage air circuit breaker equipment delivered in minimum time.

Cataloged standards give you pre-engineered, high quality equipment. And they are available for quick delivery because of the reduction of engineering and manufacturing time made possible by repetitive manufacture.

G-E Standardized Air Circuit Breaker Equipment

600 volts maximum—interrupting ratings 15,000 to 50,000 amps.

Cataloged equipments offer a wide choice of arrangements. They are listed in groups, with various combinations of manually or electrically operated breakers—either with or without instrumentation. Each group number covers a complete switchgear unit, fully co-ordinated, factory-assembled and ready to install. Any number of units can be combined in one line-up to form a complete switchboard.

For full information, contact your nearest G-E apparatus sales office, agent, or distributor, or write to General Electric Company, Schenectady 5, New York.

860-42

"Cataloged Drawout Air Circuit Breaker Equipment"

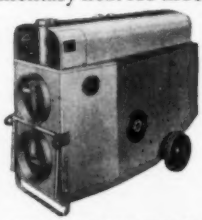
With this publication, you can order G-E air circuit breaker equipment by catalog number. Write for GEC-849.

GENERAL ELECTRIC

You can avoid layoffs, speed work in cold areas, protect perishable goods in a warehouse or provide supplementary heat for those extra cold days with safe, economical Herman Nelson Portable Heaters. Heat on wheels may enable you to continue operations during emergencies created by power failures or a breakdown of your regular heating system.

The only completely safe Portable Heater that uses flexible ducts to spot heat where most needed—and remember, only uncontaminated air heaters are absolutely safe!

Herman Nelson Portable Heaters are available in three models. Cost as little as $360. Easily moved and operated by one man.



HERMAN NELSON DELUXE I
Capacity 280,000-450,000 BTU/hr. Completely automatic, including temperature control. Fresh air delivery 2,000-2,350 cfm. Oil fired, electric powered. Other models available—with gasoline or electric power—and capacities from 125,000 to 385,000 BTU/hr.

Find out how to put portable heat to work for *you*. Mail this coupon today.

Herman Nelson Division, Dept. 72
American Air Filter Company, Inc., Moline, Illinois

Gentlemen: Please send information about Herman Nelson Portable Heaters; also my free copy of HEAT-ON-WHEELS FOR INDUSTRY.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

MEASURING & CONTROL EQUIPMENT

Begins on page 210

Acetylene Regulator

R-411 will deliver you up to 13 psi. on your small tank apparatus. It eliminates need for frequent adjustment at the tank valve and saves gas since extra pressure is never used or wasted.

The maker says a feature is easier replacement of the fabric-reinforced rubber diaphragm, valve seat, and filter screw. Pressure gauge shows you tank contents at a glance.

Linde Air Products Co., 30 E. 42nd St., New York 17.

■

Combination Relief Valves for Hot Water Tank

Temperature and pressure valves are combined in one assembly by the new McDonnell 202 Series. The valves are of the automatic resetting type, and are Btu-rated for proper selection.

An important feature, says the maker, is the fixture connection. A ¾-in. tapped opening permits taking the service water flow directly through the body of the valve—is said to make piping hook-up easier.

McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18.

Turn the page

TRY THIS GATE ON GASOLINE

Even on hard-to-hold liquids, you can obtain positive shut-off *plus* unrestricted gate valve flow. O-B gates feature the self-adjusting Flexitite® Disc—a disc with slightly flexible outer edges that nullify minor seat irregularities—form a leaktight closure each time valve is closed. Available at your local distributor. Insist upon O-B gate valves with the unique disc that closes tight—*and stays tight.*

No. 22 Line Gate Valve. ¼ to 3-inch, 150 lbs. W. S. P. 300 lbs. W. O. G. Available with Rising Stem. Ask for No. 23 Line

O-B VALVES

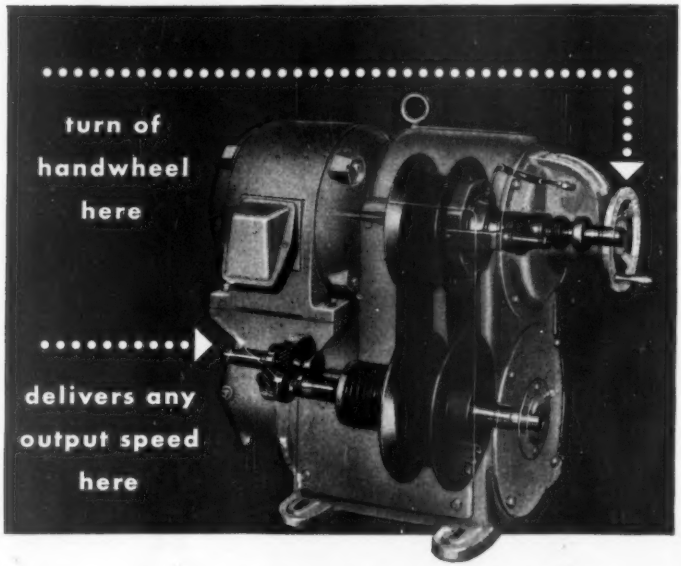
BRONZE GLOBES, ANGLES, GATES AND CHECKS FOR INDUSTRIAL SERVICE

Ohio Brass

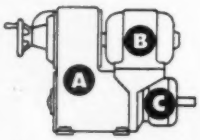
MANSFIELD • OHIO

4194-V

Simplify your speed-changing methods with Reeves Vari-Speed Motodrive®



A complete, variable speed power plant in one, compact package that releases the *full* profit potential of every machine . . . every operator



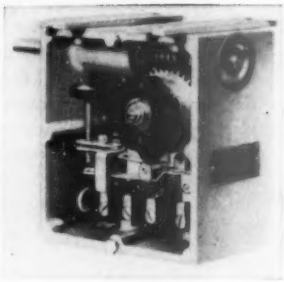
REEVES Vari-Speed Motodrive incorporates (A) REEVES speed-changing mechanism, (B) any standard, constant-speed motor, and (C) gear reducer in a single, space-saving unit easily applied to any machine. Turn of handwheel or touch of button delivers any desired speed—instantly, accurately, *positively*—without stopping the machine. Widens machine work range; increases rate and quality of production; and utilizes highest skill of operator. Specify REEVES Vari-Speed Motodrives for the machines you build or buy. Sizes to 25 hp; speed ratios as great as 10 to 1. Send for free catalog to Dept. 14F.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA
Recognized leader in the specialized field of variable speed control

REEVES Variable Speed Drives
for accurate speed control

MEASURING & CONTROL EQUIPMENT

Begins on page 210



Rotary Limit Switch

Limits the travel of rotating parts of machines or equipment such as electric doors, hoists, and valves.

This switch coordinates reversing operations with the rotation of the motor shaft, or other operating shaft, to break contact. Timing is governed by a pre-set number of shaft revolutions.

Furnas Electric Co., 1032 McKee St., Batavia, Ill.

■

Electrical Indicating Dynamometer

The new Dillon model EL traction dynamometer can be set for any load up to 100,000 lb. It will operate electrical warning signals, relays, motors, switches, etc.

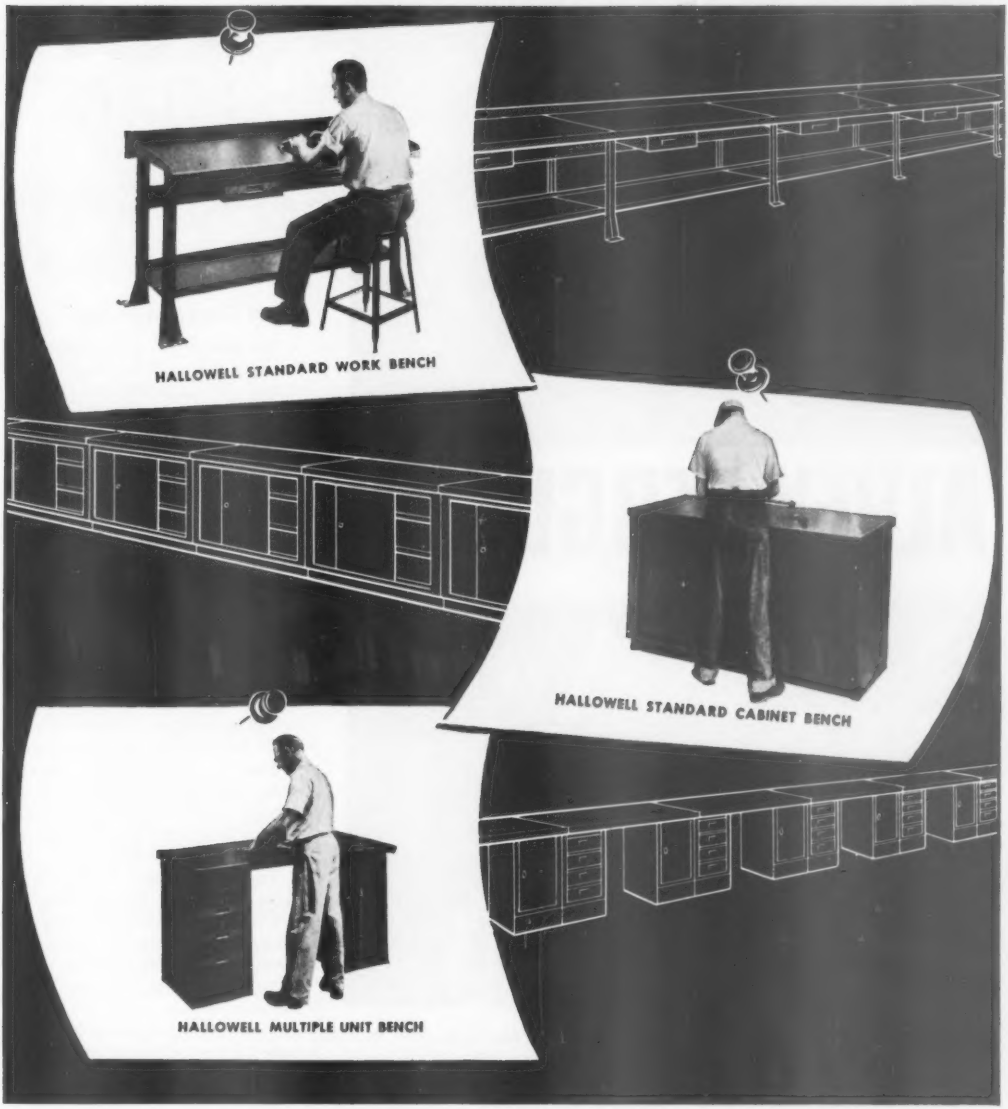
Does not depend upon springs. Works on principle of deflecting a calibrated beam. And it's rugged enough to be used as a field instrument.

W. C. Dillon & Co., Inc., 1421 S. Circle Ave., Forest Park, Ill.

Turn the page

ALL 3 HALLOWELL BENCHES

can be installed individually or in continuous line

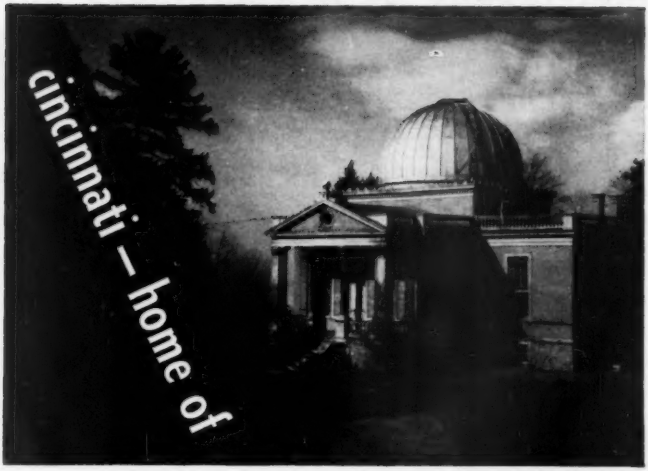


Standard, interchangeable HALLOWELL Benches can be used individually as required. But, unlike with ordinary benches, multiple units can be quickly and easily assembled to make a continuous bench of any desired length. Write today for literature. STANDARD PRESSED STEEL CO., Jenkintown 11, Pennsylvania.

HALLOWELL SHOP EQUIPMENT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

FIRST Astronomical Observatory in the United States was built in Cincinnati; the Observatory of The University of Cincinnati, pictured here, is its outgrowth.



ALVEY-FERGUSON

the original-Since 1901

FIRST in the field of Case, Keg, Barrel and Package Conveyors since 1901, The Alvey-Ferguson Co. has installed every type of conveying system in every type of plant. In this large brewery an A-F Skate Roller Conveying System handles empty cartons from carton make-up department to automatic filling machines. Being overhead, the A-F Conveying System keeps aisleways clear, and may be used for carton storage.

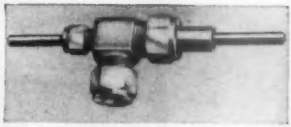
YOU can SEE the SUPERIORITY of ALVEY-FERGUSON Conveyor ENGINEERING

For a discussion of latest efficient handling methods write:

THE ALVEY-FERGUSON CO.
140 Disney Street, Cincinnati 9, Ohio

Begins on page 168

VALVES & FITTINGS



Heat Exchanger Tee

The Swagelok heat exchanger tee was designed for steam jacketting or temperature control of process lines. Precision-built for numerous uses in laboratories or process industries.

You can get this fitting in brass, aluminum, steel, stainless steel, and monel.

Crawford Fitting Co., 884 E. 140th St., Cleveland 10.

■

Slip-On Fittings for Structural Pipe Work

You can eliminate threading or welding and save on cutting pipe with Nu-Rail Slip-On fittings.

They're made of corrosion-resistant aluminum alloy. And you can get them in five basic fittings plus a floor and wall flange and a drive fit end cap.

They fit standard pipe sizes from ¾ in. to 2 inches. You can use them individually or in combination to make practically every conceivable type of fitting available, according to the manufacturer.

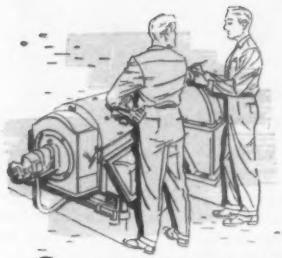
Load-carrying ability is limited only by the pipe used. Should any pipe structure require changes or alterations, adjustments can be made easily. And, with few exceptions, you can salvage practically all the materials. Illustrated catalog available.

Hollaender Mfg. Co., 3841 Spring Grove Ave., Cincinnati 23.

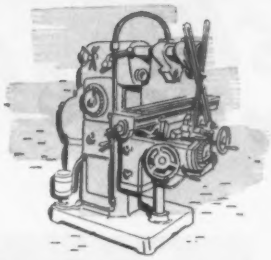
Turn the page

GULF PERIODIC CONSULTATION SERVICE

gives you expert help on every phase of lubrication

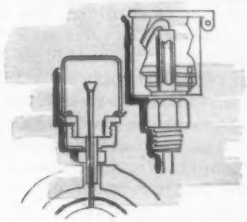


❶ surveys of equipment

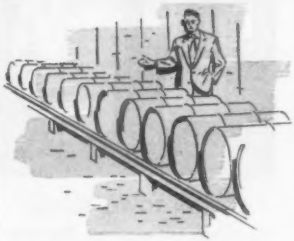


❷ specific recommendations

❸ lubrication charts



❹ application methods



❺ storage and handling

❻ individual problems

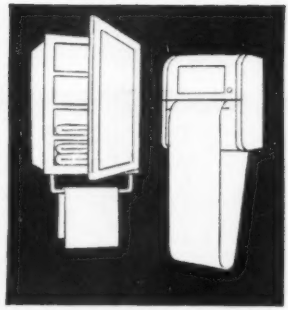
Gulf's comprehensive lubrication plan can help you reduce costs straight down the line. Call your nearest Gulf office today.

GULF OIL CORPORATION • GULF REFINING COMPANY
PITTSBURGH 30, PENNSYLVANIA

GULF SERVES INDUSTRY

COBWEBS IN THE THINK TANK?

Go wash your face!



Call it weariness, mental fatigue . . . or just the time of day . . . when you find yourself floundering on the job and want to wake up—GO WASH YOUR FACE. You'll be surprised how quickly your tired muscles and jangled nerves respond to soap and water and a rub with a fresh, absorbent cotton towel.

COTTON TOWEL SERVICE

No investment required. Get complete service on a low-cost basis. Under "Towel Supply Service" or "Linen Supply Service" in the telephone book, you'll find your suppliers—call them today!

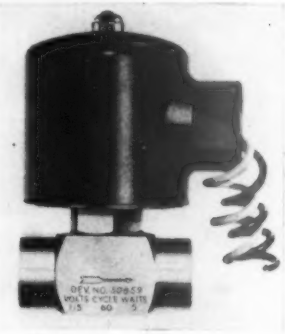
You can rub and rub to your heart's content—even with a heavy beard, cotton towels will not shed or leave a trail of residue on your skin.

WHAT PICKS YOU UP, PICKS UP YOUR EMPLOYEES. When you provide clean cotton towels, workers get added benefits from their rest periods. Watch efficiency, production, and morale climb when "Cotton Fresh-Up" is on the job.

Linen Supply Association of America
and NATIONAL COTTON COUNCIL
22 WEST MONROE STREET, CHICAGO 3, ILLINOIS

VALVES & FITTINGS

Begins on page 216



All-Purpose Solenoid Valve

Moisture and frost-resistant coil construction prevents coil burn-out and gives this new valve longer life. The conduit connection in the cover can be rotated to any position.

If you want positive seal-off, you can get the valve furnished with a synthetic resilient disk-type needle, seating against a stainless steel orifice. For other applications, the valve has a stainless-steel needle combined with a high-strength, corrosion-resistant, stainless-steel valve seat.

Capacity in water application is 78 gph. and on refrigerant 1 ton Freon 12. Working pressure up to 300 psi. Operation differential: liquid lift up to 130 psi., air and gases 250 psi., refrigerants 200 psi.

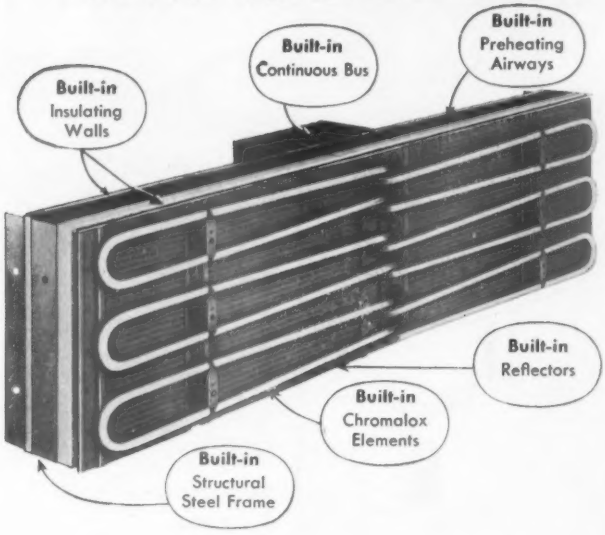
A-P Controls Corp., 2450 N. 32nd St., Milwaukee 45, Wis.

■

HYDRAMOTOR VALVE that opens fully in one minute even at temperatures of 65 F. below zero has been developed by General Controls Co., Glendale, Calif. You can use the valve for any flowing medium. And you can get it in either remote or manually controlled models. Available in sizes up to 6 in., with pressure ratings from 2 in. at 600 psi. to 6 in. at 65 psi.

Turn the page

Announcing a **new** and **better** *INFRARED* Generator



CHROMALOX *Electric* RADIANT PANELS

Now, more efficient *far*-infrared comes in convenient pre-engineered panels, reducing oven building to a matter of determining heat requirements and assembling panels to fit the job.

CHROMALOX Electric Radiant Panels generate more uniformly absorbed *far*-infrared heat with quick heat-up and reduced oven lengths.

It's the *far*-infrared wave length that makes the difference.

- ✓ **9200 Btu's per square foot output per hour.**
- ✓ **Insulated for voltages to 575 V.**
- ✓ **Lowest installed cost per kilowatt and per square foot.**
- ✓ **Work temperatures to 700° F. easily obtained.**
- ✓ **Accurate "dialed" control.**
- ✓ **Absolutely uniform radiation—no hot or cold spots.**
- ✓ **Built to UL and NBFU requirements.**

Now . . . Oven Building as Simple as A B C

It's easy to build ovens of any desired height and length with lightweight Chromalox Electric Radiant Panels. Panels come in 1 x 4 ft. and 2 x 4 ft. sizes, ready to erect and connect with easy-to-follow instructions in each carton. Chromalox on-the-spot engineering assistance to help determine your requirements is yours—no obligation, of course.

CHROMALOX *Electric Heat*

Does More - Better - Consistently

Radiant Heating Division EDWIN L. WIEGAND CO., THOMAS BLVD., PITTSBURGH 8, PA.

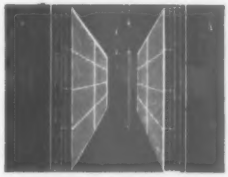
CHROMALOX FAR-INFRARED

For Baking, Drying, Curing, Dehydrating

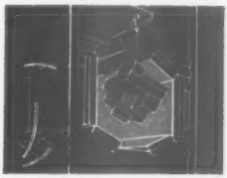
and many other applications.

9 WAYS BETTER

1. **Longer wave length**—absorbed equally fast by all colors.
2. **Shatter-proof construction**—nothing to break and contaminate.
3. **Non-diminishing output** from all-metal Chromalox tubular heat generators.
4. **Uniform heat**—no hot or cold spots.
5. **High intensity radiation**—with more watts per square foot.
6. **Quick heat-up** with energy transformed instantly into heat on the work.
7. **Low-cost oven assembly.**
8. **Infinitely variable output**—from 0 to 100% of capacity.
9. **Additionally safe** for any work involving volatiles.



Easily erected banks of Chromalox Radiant Panels are ideal for line production. Far-infrared heat is radiated directly and uniformly without hot spots over entire work area.



Chromalox Radiant Panels can be erected into any oven shape. Rugged construction permits their use in assembly lines, even when hazards of splashed liquids, volatiles and moisture are present.

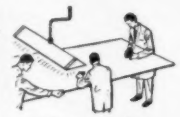
Get this Bulletin

It contains complete information, specifications and application ideas for the use of Chromalox Radiant Panels. Write for your copy today.

IC-66

Only plywood gives you all 6

Exterior plywood samples are boiled to prove 100% waterproof bond


1 Tested Quality

2 Large Panel Size

3 Cross Laminated Strength

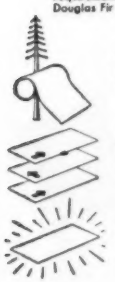
4 Workability

5 Attractive Appearance

6 Light Weight

GRADE-TRADEMARKS on industry-inspected Douglas fir plywood do far more than identify type and grade—they are positive assurance of quality products, made, inspected and tested in strict accord with rigid U. S. Commercial Standards. Every day, plywood samples are random-selected from factory production lines. Some are given accelerated performance punishment in industry laboratories. Others get extended field exposure tests. This industry quality-maintenance program is but one good reason why Douglas fir plywood can be *depended on* for hundreds of building, remodeling and manufacturing jobs. Plywood will meet your tests, too!

U. S. Commercial Standard CS45-48 details performance requirements, gives types, grades, sizes. For free copy, write Douglas Fir Plywood Association, Dept. 4910, Tacoma, Wash.



Douglas fir plywood is real wood, made by "unwinding" giant logs

into thin wood sheets which are inseparably cross-laminated

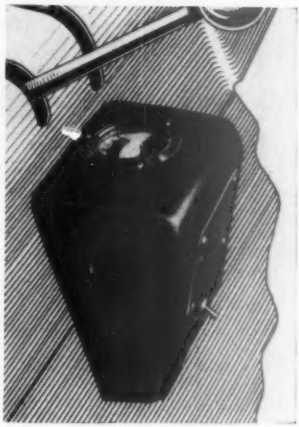
to form large, light panels having beauty and great strength

Douglas Fir Plywood

AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

Begins on page 168

MISCELLANEOUS



Battery Charge Indicator

This meter tells your truck operator at a glance when battery charge is low. Prevents repeated overdischarge that shortens battery life—and should end those alibis.

The instrument is balanced to read accurately regardless of the angle of mounting or the truck's position. A toggle switch disconnects the indicator from the battery during charge.

Gould-National Batteries, Inc. Trenton 7, N. J.

■

NEW NYLON-LINED BEARING—made of a thin, drawn steel outer sleeve and a free-floating liner of DuPont FM 10001 nylon — has been developed by Thomson Industries, Inc., Manhasset, N.Y. A spiral gap compensates for expansion and contraction. It also distributes lubricant received through a hole in the outer sleeve. The nylon liner gives you an instantly replaceable bearing surface.

Turn the page

"We would pay a premium for these 50,000 Air Shipments yet we actually saved thousands of dollars!"

Robert S. Woolf, Mgr., Teletranscription Dept., Dumont Television Network

"When we ship TV film, we're interested in *service*. We can't afford to take any other attitude. We've bought program time all over the country, and those programs *must* be filled.

"We at Dumont use Air Express. It's the fastest. It has all-point coverage. Above all, it is DEPENDABLE.

"As to cost – Air Express costs Dumont *less* than other air services would, by thousands of dollars per year! For instance, on our regular shipments to Detroit, other services cost 37% to 337% *more* than Air Express. And we can't duplicate the service at any price!

"The Air Express people have carried upwards of 50,000 shipments for Dumont in the last four years. Their ability to trace shipments – especially when being shuttled between stations – is almost uncanny! It has helped us out in many an emergency.

"It pays to specify Air Express – in more ways than one!"

AIR EXPRESS

GETS THERE FIRST

Division of Railway Express Agency
1952 – our 25th year of service

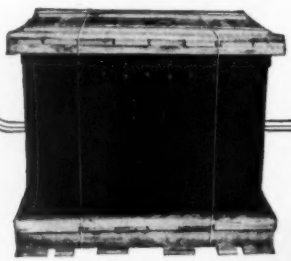
U·S·S Gerrard Steel Strapping fits all your tying jobs better!

● Gerrard Round Steel Strapping is versatile enough for all types of packing, from light cartons to large crates, from circular packages to odd-shaped bundles and heavy pallets.

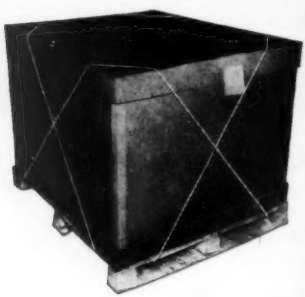
Gerrard Strapping complies fully with Army-Navy specifications JAN-P-106A, JAN-P-107, and JAN-P-108 for overseas packing. It assures a tight, secure tie to final destination.

Call a Gerrard engineer for further information about the grade of Gerrard Round Steel Strapping and the type of Gerrard machine that will best fit your specific tying needs.

Model T1 machine on suspension arm, securely ties two 16 ga. galvanized steel straps around a carton of powder. This method of closure permits re-use of carton many times.



Pallet reinforced with Gerrard Round Steel Strapping permits quick packing and easy handling of shell cases.



Gerrard Round Strapping permits a tight Diagonal Tie to give firm reinforcement to all 6 sides of a carton, increasing its strength and rigidity.

Lift truck handles building tile quickly. Note only the two top layers need be strapped to make a firm pallet that protects material and stacks safely.

U·S·S GERRARD ROUND STEEL STRAPPING

GERRARD STEEL STRAPPING DIVISION, UNITED STATES STEEL COMPANY

2927 West 47th St., Chicago 32, Ill.

USS

UNITED STATES STEEL

MISCELLANEOUS EQUIPMENT

Begins on page 220

Sump Tank Cleaning Machine

This unit will quickly remove dirty coolant or cutting oil and all chips and sludge from the sump tanks of machine tools.

The tank has a removable sludge basket with a capacity of 100 lb. A replaceable fabric filter bag retains solids, and the clear oil or coolant collects in the storage tank.

Model 20-T, series NA, can pump 25 to 30 gpm. It has rubber-tired wheels and can be moved easily through crowded aisles.

W. R. Carnes Co., S. Main St., Verona, Wis.

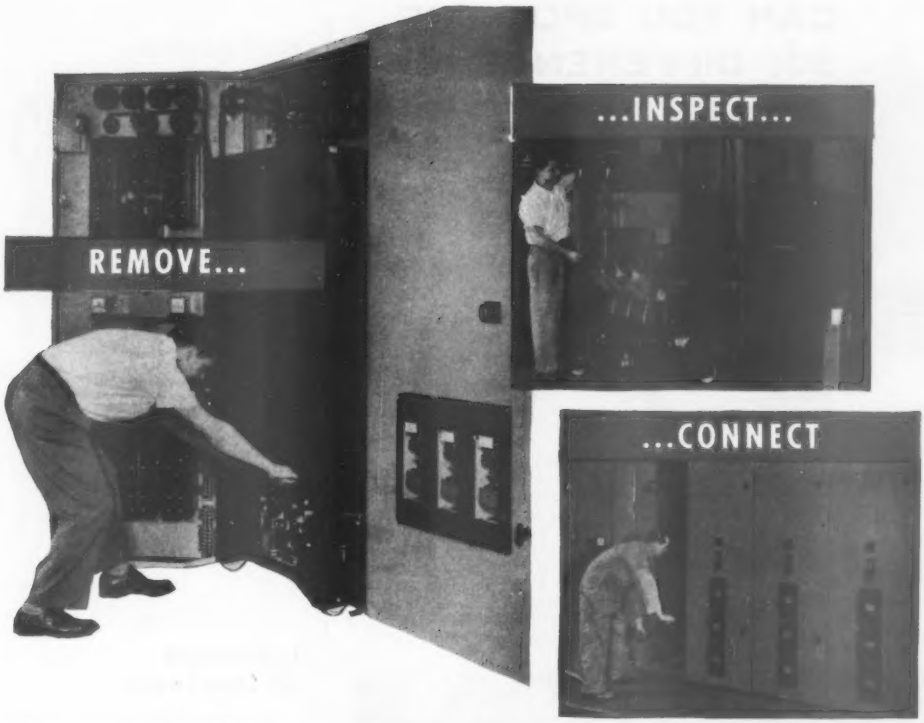
■

HEAVY-DUTY DEHUMIDIFIERS that can remove 30 to 50 gal. of moisture from the air in a day, have been introduced by Frigidaire Div., General Motors Corp., Dayton 1, Ohio. They are described as especially adaptable for installation in storage rooms, manufacturing and inspection areas, and packaging departments. An adjustable humidistat turns mechanism on and off to maintain proper relative humidity.

■

WATERPROOF SANDPAPER with a new, extremely tough backing that permits maximum flexibility, has been developed by Behr-Manning Corp., Troy, N.Y. Tufbak features freeness of cut and ability to maintain the initial sharp bite needed in wet sanding.

Turn the page



It's easier, faster, safer with Westinghouse horizontal drawout switchgear!

You can remove breakers, inspect them, and replace them in only a few minutes when you use Westinghouse Type DH Metal-Clad Switchgear. Because breakers are drawn out horizontally, no lowering or lifting is necessary. A shutter indicator, visible from the front, provides positive indication of disconnect position. As the breaker is withdrawn, a grounded metal shutter closes to isolate stationary contacts.

When the breaker is removed, interphase barrier and arc chutes remove easily to expose contacts at an accessible and convenient working height for quick inspection.

Replacing the breaker is just as easy and safe. A few easy turns of a crank move the breaker from disconnect to operating position. A mechanical interlock positively prevents engagement of crank linkage unless the breaker is open.

For complete information on Westinghouse Metal-Clad Switchgear for indoor or outdoor service write for Booklet B-5306. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-60792

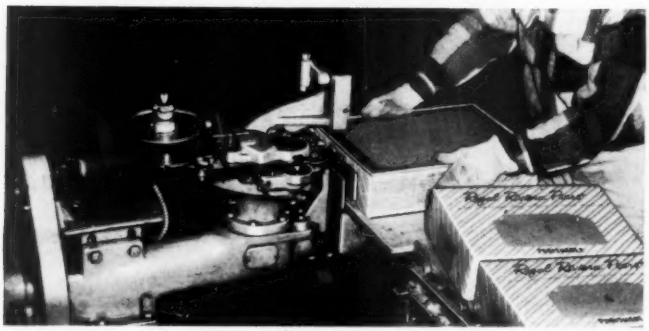
CAN YOU SPOT THE 90¢ DIFFERENCE?

The two boxes are almost identical. One is tied with wire. The other shows how Bostitch field men can cut costs—the lid of the box is fastened to the bottom with just *four* wire staples.

By switching to Bostitch, this fruit packer was able to save 90c out of every dollar formerly spent for wire.

And that's not all. The packer further reports that his boxes look better, stack better, travel better. His shipping-room employees are a lot happier. And his customers say the boxes are easier to open and the fruit is less likely to be bruised.

Whatever business you're in, whatever your present method for closing cartons or fastening materials, you'll do well to check into the services Bostitch offers. You'll be surprised how many different fastening jobs Bostitch can help you with.



AT THE END OF THE LINE, boxes are securely fastened with Bostitch S2B wire stitchers. Bostitch makes 30 different machines for doing all kinds of shipping-room jobs.

FREE BULLETIN *describes 30 of the 800 Bostitch models used for wrapping or packaging. Just mark and mail the coupon.*

THERE'S A BOSTITCH MAN NEAR YOU— *300 field men in 123 cities in the U. S. and Canada. Bostitch service is always nearby.*

BOSTITCH, 610 Mechanic Street, Westerly, R. I.
Please send me a free copy of your bulletin on Bostitch stapling machines for shipping-room use.
I am particularly interested in a better and faster method for:

☐ Assembling cartons ☐ Sealing corrugated wrappers ☐ Covering barrels
☐ Bottoming ☐ Repairing cartons for re-use ☐ Tagging
☐ Top-sealing ☐ Bag-sealing Other _____

Name _____
Company _____
Address _____
City _____ *Zone* _____ *State* _____

BOSTITCH® fastens it better, AND FASTER with wire

ALL TYPES OF MACHINES FOR APPLYING STAPLES
ALL TYPES OF STAPLES APPLIED BY MACHINES

MISCELLANEOUS EQUIPMENT

Begins on page 220

Lightweight All-Steel Ladder

This new ladder is only slightly heavier than the magnesium ladder—but lower in cost. And it's stronger than wood, aluminum, or magnesium ladders.

The maker claims that steel eliminates all the structural deficiencies of the non-ferrous ladder. Sizes from 4 to 12 ft.

Eastern Engineering & Equipment Co., 1060 Broad St., Newark, N. J.

■

New Index Head

Any handy man can set up and operate this high-speed, precision index head in about five minutes, says the manufacturer. Spacing is obtained by merely manipulating two levers against stops.

The head can be mounted horizontally or vertically for any spacing operation up to 100 divisions, milling or drilling. And it can be used to machine elongated holes on a radius in one cycle.

A. C. Willbrand Engineering Co., 627 Orwood Pl., Syracuse 8, N. Y.

Turn the page

CUT voltage loss to a minimum

with re-designed high efficiency feeder busduct

IT'S THE LAST WORD in efficient, flexible and economical power distribution from service entrance to distribution center, from generator to switchboard and from switchboard to distribution center.

Re-designed, inside and out, to assure maximum efficiency, FA High Efficiency Feeder Busduct has proven, in actual tests, that it will *reduce voltage loss to less than 2 volts per 100 feet at 80 percent power factor.*

Made for either indoor or outdoor installation, this new, more efficient method of power transmission has smaller size enclosures, less weight, and perforated sectional covers — top and bottom — for maximum heat dissipation.

Conductors are insulated with varnished cambric tape and plastic type tape for maximum protection. Joints are electrosilver plated (by immersion) for better low resistance contact and secured by either two or four brass jam bolts that fit into elongated fastening holes to allow for expansion, and phosphor bronze-cupped washers to maintain pressure.

The fact that sections can be run either vertically or horizontally, up and around pipes and other difficult angles and through walls, floors and ceilings, makes this type FA Feeder Busduct even more desirable.

FA High Efficiency Feeder Busduct is available in capacities, from 600 to 4,000 amps., 600 volts single phase for welder service, three phase for power, three-phase, four wire service for light and power.

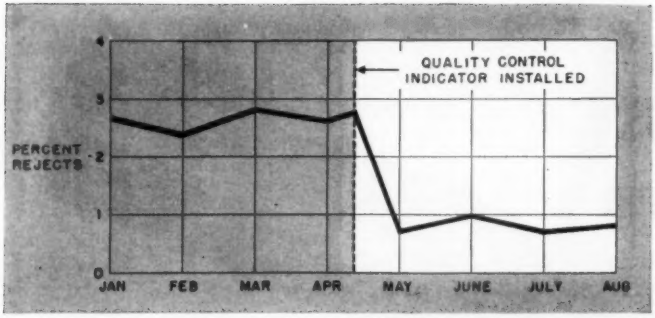
For additional details, consult your nearest FA representative listed in Sweets. He'll gladly tell you more about this modern, more efficient system of power and light distribution.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

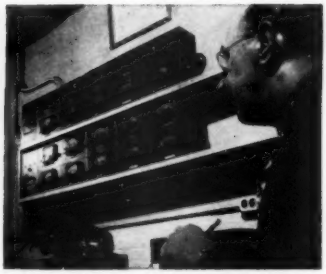
Our 61st Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER



REJECTS DROP WHEN YOU INSTALL G-E QUALITY CONTROL INDICATORS

Inspector just pushes a button at test station to record rejected unit.



Foreman's indicator automatically calculates existing quality level.

HERE'S WHY: By instantly indicating excess rejects, they permit quick corrective action

G-E Quality Control Indicators continuously and automatically provide the information ordinarily plotted on control charts. They analyze the reject-production rate and show immediately when the upper control limit is exceeded.

By eliminating the time delay associated with statistical control charts, action can be taken immediately to correct the faulty manufacturing process.

Each meter in the foreman's office indicates the existing reject level for one inspection characteristic. When rejects exceed the allowable level, trouble shooters know exactly where the fault lies.

G-E Quality Control Indicators are used on 100% inspection lines producing up to 5000 units per eight-hour shift. If you inspect your product in whole or in part, you have an application for this device.

For more information on the first and only instantaneous, automatic quality control, contact your nearest G-E Apparatus Sales Office or write General Electric Company, Section 687-94, Schenectady, New York.

GENERAL ELECTRIC

MISCELLANEOUS EQUIPMENT

Begins on page 220

For Three-Way Timing Control

The Durachron spring-wound stopclock gives you the accuracy of a fine stopwatch. In addition, it's easy to read and is built to take hard knocks.

You can read:

- **Time out.** Stop the action, read elapsed time, then resume timing without returning to zero.
- **Straight timing.** Stop the hands, read elapsed time, then return to zero and start over.
- **Snap-back timing.** Read the time "on the fly" while sweep hand is in motion, then snap hands back to zero by pressing the top stem—without stopping the clock.

Andrew Technical Service, Chicago 13.

■

Instrument Tubing Harness

Dekoron Impervapak Metl-Cor is made of a bundle of copper or aluminum tubes over which is extruded a 1/16-in. sheath of high molecular weight black polyethylene plastic.

It is said to be corrosion-proof and to have lower initial cost than corrosion-resistant alloy tubing.

Available in lengths up to 50 feet. The standard line is supplied with 4, 7, or 10 metal tubes of ¼- or ⅜-in. outside diameter.

Samuel Moore & Co., Dekoron Tubing Div, Mantua, Ohio.

■

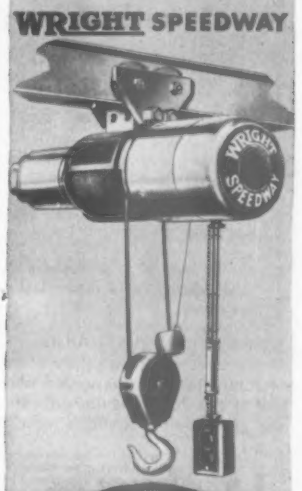
SPIRAL BACK-UP RING for "O" ring seals in hydraulic service will not shrink, swell, harden, or soften, according to W. S. Shamban & Co., 5747 Marilyn Ave., Culver City, Calif. Kelon-T is chemically inert—has very low friction and is unaffected by oils, acids, bases, or solvents. Useful temperatures from −110F. to +500F.

Turn the page

ACCO products

☑ Check your Hoist needs...

● Here's a check list of the complete line of WRIGHT Hoists that will show you the many models available for a wide variety of lifts around your shop or plant.



WRIGHT Hand-operated Equipment

STYLE	TON CAPACITY
CRANES WITH END TRUCKS	
☐ Top running, hand traveling	1 to 20
☐ Underhung, hand traveling	1 to 10
HOISTS	
☐ Wright Safeway, light, portable	½ to 4
☐ High speed, improved	¼ to 50
☐ Clevis-connected	¼ to 10
☐ Handwheel, extended	¼ to 3
☐ Twin hook	¼ to 10
☐ Differential	¼ to 1½
TROLLEY HOISTS	
☐ Wright Safeway	½ to 4
☐ Wright Army type Safeway	¼ to 10
☐ Hi-Way 600 type	¼ to 24
TROLLEYS ONLY	
☐ Timken	¼ to 40
☐ Hyatt	¼ to 5
☐ SARB	¼ to 12
☐ Wrightway	½ to 3
☐ Double beam	2 to 20

WRIGHT Motor-driven Equipment

CRANES	
☐ Top running	1 to 10
☐ Underhung	1 to 10
HOISTS	
☐ Frame 1, Speedway	¼ to 1
☐ Frame 1, Speedway, close headroom	¼ to 1
☐ Frame 1, Speedway, long-lift	¼ to 1
☐ Frame 2, Speedway (all suspensions)	½ to 6
☐ Frame 3, Speedway (all suspensions)	1½ to 10

for information on the complete line of WRIGHT ELECTRIC HOISTS write for ***Catalog E-50A***

WRIGHT
Hoists
Trolleys
Cranes

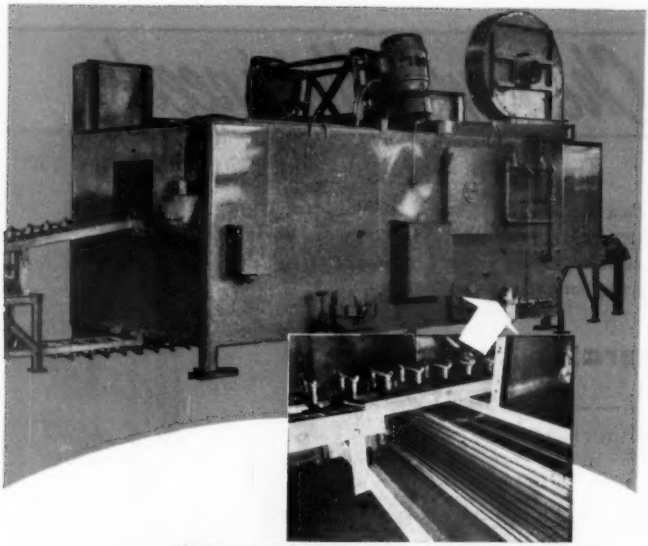
ACCO

TRADE MARK

York, Pa., Chicago, Denver, Detroit, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

In Canada: **UPTON, BRADEEN & JAMES LTD.**
Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver



use of PLATECOILS gives CENTRI-SPRAY WASHING MACHINES construction and sales advantages

In building several of these motor block washers for a large automobile manufacturer, Centri-Spray, Inc., Detroit, Michigan has found that the use of Platecoils has 6 important advantages.

1 **Higher heat input per cubic foot for quicker heat-up.**

2 **Easier installation with Platecoil banks.**

3 **At least 90% of threaded pipe joints eliminated to reduce leakage problems.**

4 **Longer service without cleaning.**

5 **Less condensate trapping in Platecoil bank as compared with serpentine pipe coil.**

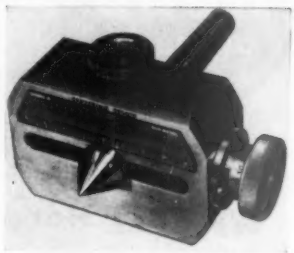
6 **No wire cutting in return bends through much lower steam and condensate velocity.**

A bank of three 18 x 83 Platecoils is used instead of a pipe coil consisting of 42 pieces of one inch pipe 85″ long, and two pieces 87″ long. In addition 44 return bends were needed plus the straps and separate tie bars required. Use of the Platecoils not only simplifies fabrication for Centri-Spray, but it also gives their customer a more efficient, dependable washer.

Why not investigate using Platecoils in your products? You will find, as other manufacturers have, that Platecoils save time in estimating . . . that Platecoils save time and labor in fabrication . . . and that customers are better satisfied with Platecoil performance. **Write today for Bulletin P60.**

MISCELLANEOUS EQUIPMENT

Begins on page 220



Two Tools in One

A lathe tailstock centering device and taper turning attachment are combined in the Taper Master attachment. Goes into the lathe tailstock without any special fitting or machining for immediate use. You can get sizes to fit lathes from bench type to extra heavy duty.

Master-Taper Co., 4531 N. Beacon St., Chicago 40.

■

PLUNGER SLICK, a new high-temperature lubricant for cold-chamber die-casting machines, eliminates all galling and sticking of the plunger. Coating will not run off plungers and cylinder walls at high temperatures. And it gives complete protection against the corrosive action of molten aluminum. You can get five to seven more casting shots between applications according to G. W. Smith & Sons, Inc., 54 Kemp Rd., Dayton 3, Ohio.

■

THREAD PROTECTORS for safeguarding external and internal threads and surfaces on machined parts are offered by the Precision Paper Tube Co., Chicago. You can get them custom-fabricated with the imprint of your company's name, part number, etc. They are made of kraft, fish paper, cellulose acetate, or combination. Acid free and non-corrosive, they can be used to keep out oil and grease or as lubrication retainers.

Turn to page 410

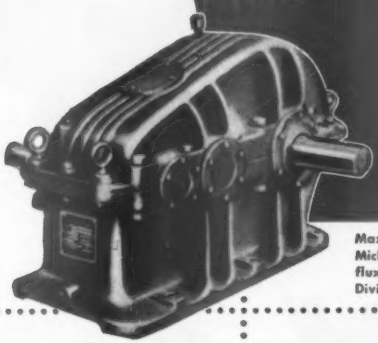
low cost heavy duty service with Foote Bros. MAXI-POWER

Costs go down when Foote Bros. Maxi-Power drives are installed! These rugged helical gear drives assure high efficiency — low maintenance costs — operate day after day, year in and year out without trouble and with minimum maintenance.

Precision-Generated Helical Gearing with uniform load distribution across the entire face permits maximum load carrying capacity in minimum space and assures the maximum in reliable, uninterrupted performance.

These drives are available in single, double and triple reductions, with ratios ranging from 2.08 to 1, up to 360 to 1. Capacities up to 1550 h.p.

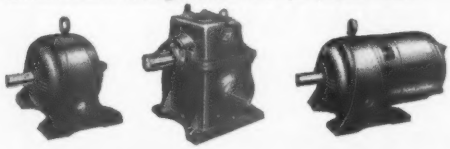
FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Blvd. • Chicago 9, Ill.



Maxi-Power drive at Murray Corporation of America, Ecorse Michigan Plant, driving tubular conveyor handling welding flux. Designed and manufactured by Hapman Conveyor Division of Hapman — Dutton Co., Kalamazoo, Michigan.

FOOTE BROS.

Better Power Transmission Through Better Gears



Foote Bros. Gear and Machine Corporation
Dept. I, 4545 S. Western Blvd., Chicago 9, Ill.

Please send Bulletin MPB containing full information on Maxi-Power Drives.

Name.....

Company.....

Position.....

Address.....

City..... *State*.....

The man who sneezed

at $104,000.00

By Mr. Friendly

"My philosophy is simple!" Said Jones, the famous treasurer,
"If a dollar saved is pleasure... a fortune saved is *pleasurer!*"
We said, we'd saved one company a *hundred grand or so!**
"A round, firm, fully-packed sum!" he cried,
"A sum to make a man glow."
"It's twice as pleasing as 50 grand, and 10 times as pleasing as 10."
Then he started sneezing to beat the band,
and did it again and again!
The moment he heard his dreadful "Ka-choo!"
he knew as a treasurer he was through;
For any treasurer will tell you *that*,
this is a sum you can't sneeze *at!*

*THE CASE OF THE DODGE CORPORATION

Company: Dodge Manufacturing Corporation of Mishawaka, Ind. "First in power transmission machinery."

Record: An American Mutual policyholder for over 30 years.

Savings through lower premiums: $75,000 in last 8 years alone.

Savings through dividends: More than $29,000.

Total Savings: More than $104,000.

Moral: If you're interested in service that can help reduce costly accidents and premiums . . . and help raise production and employee morale, write for the complete case of the Dodge Corp., American Mutual Liability Insurance Co., Dept. F-44, 142 Berkeley St., Boston 16, Mass.

AMERICAN MUTUAL

Service from salaried representatives in 78 offices! • Savings from regular substantial dividends!

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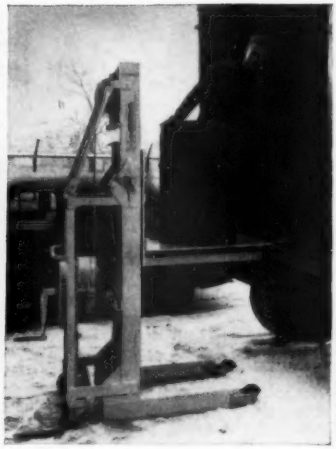
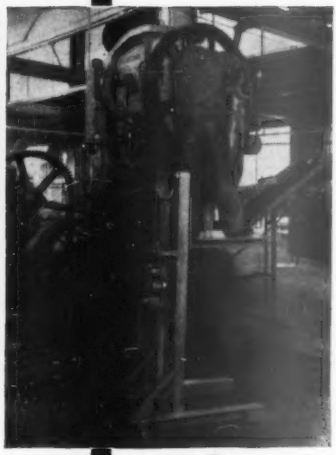
BARRETT "5-HUNDRED" PORTABLE ELEVATOR

Your best investment for plant service





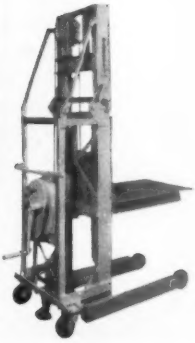
You don't have to *look* for lifting jobs to give this low-priced eager beaver . . . it *finds* them all around your plant—day in and day out. It goes right to the job . . . lifts or lowers . . . and moves on to other money-saving chores. That's Barrett "5-Hundred"—and its brothers—the famous all-purpose line of Portable Elevators with 500, 1000 and 2000-lb. capacities.

These hand-operated elevators are engineered for safe, easy, one-man use. Handle barrels, drums, bales, crates, boxes or dies . . . save time in loading and unloading . . . ideal for ceiling or overhead repairs . . . ready to double as a supporting bench for long steel, pipe or lumber lengths.

YES, SIR . . . you will find one of the "Hundred" line just suited to your plant requirements. It will save plenty of man-hours and space at a small investment.

GET THE *FULL* STORY—we will send complete details and prices promptly upon request.

MODEL "5-Hundred." Capacity 500 lbs. Crank operated. Lifting height 5'—platform 24"x24"x 5½" high. Also available with 7' lift.



MODEL "10-Hundred." Capacity 1000 lbs. Two-speed operation. Lifting height 6'4"—platform 24"x30"x7" high.

Also, Model "20-Hundred." Cap. 2000 lbs. Two-speed—Lift 5'8"—platform 24"x36"x7" high.

BARRETT-CRAVENS COMPANY
4629 S. Western Blvd., Chicago 9, Ill.
Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

How High Standard Mfg. cuts costs by using POWERDUCT from busduct to machine

"Powerduct Cable means a big saving for us," says Frederick Lynn, chief electrician at The High Standard Mfg. Corp., Hamden, Conn., makers of Hi-Standard firearms, internationally famous for their accuracy and painstaking craftsmanship.

"You'd be surprised that a very big item is being able to use Powerduct over and over again as production increases and model changes are made. Twelve feet, fifteen feet, it doesn't make any difference. I'm able to use it any place. Powerduct is never wasted. That's why it's less expensive.

"Because busduct with Powerduct means complete flexibility, we increase the use and mobility of the machine. Our crew saves many man-hours by being able to plug in Powerduct instead of wiring a whole rigid conduit system."

"For heavy equipment we plug the cutout in the busway and run the Powerduct almost directly to the machine. It's not likely this machine will be moved, so the usual loop is not necessary."

"Here's the installation for lighter equipment. By varying the size of the loop I can move the machine."

Powerduct complies with Section 3646 to the 1951 National Electrical Code.

Powerduct has full Underwriters' approval, costs less than any other approved type of cable. For further details on Powerduct, contact your nearest Anaconda Distributor or Anaconda Sales Office—or write to Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

52376

the right cable for the job ANACONDA® wire and cable

Let this booklet show you the way to

INCREASED PRODUCTION EFFICIENCY THROUGH INDUCTION HEATING

Westinghouse has prepared a Case History Booklet showing a few of the Induction Heating applications presently being used by some of America's largest manufacturers. It's one amazing record after another of what Induction Heating can do . . . backed up by product, production and cost comparison figures. Some cases may remind you of situations in your plant. Others may suggest application possibilities not yet tried. But all the stories will give you a good idea of the ever-increasing scope of Induction Heating.

Already, thousands of different parts are being hardened, annealed or joined by Induction Heating. But there are thousands more that could be . . . and should be heat treated by this method. *Because in virtually every case where Induction Heating has been put to work, the user has gotten increased production efficiency . . . at lower operating cost!* But see for yourself what this outstanding tool can do. Just clip the coupon for your free copy of this informative booklet — or drop us a line with your request to Westinghouse Electric Corporation, Dept. F-38, 2519 Wilkens Avenue, Baltimore 3, Maryland.

CLIP THIS COUPON

Westinghouse Electric Corporation
Electronics & X-ray Division, Dept. F-38
2519 Wilkens Avenue
Baltimore 3, Maryland

Please send me a copy of the detailed Westinghouse Induction Heating Case History Booklet.

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Company _____

Street _____

City _____ Zone _____ State _____

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INDUCTION HEATING

NEW CORROSION INHIBITOR
STOPS RUST ...CUTS COSTS

If you make—ship—or store metal parts that rust can damage . . .

HERE'S IMPORTANT NEWS

New Shell "VPI" is effective in even the most difficult cases of rust prevention—and it's easy to use, too. "VPI" is a volatile corrosion inhibitor which comes in both crystal and paper wrap form.

Whenever moisture is in air, "VPI" vaporizes and makes air noncorrosive. "VPI" is applied quickly . . . containers do not have to be airtight. Container costs are reduced. Handling costs are lower because there's no greasing and degreasing . . . no need for expensive rust-removal jobs after part is unpacked.

Your Shell Representative can give you more information about the "VPI" method of rust prevention. Call him today. Or write to nearest address listed below.

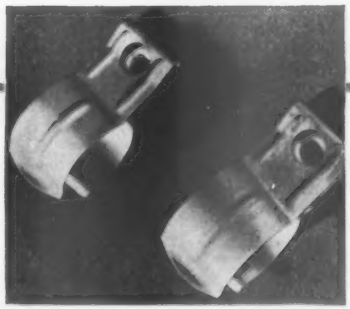
SHELL OIL COMPANY
50 West 50th Street, N. Y. 20, N. Y.
100 Bush Street, San Francisco 6, Calif.

SHELL

VPI

(a volatile corrosion inhibitor)

stops air and moisture from making rust.



"VPI" can be used many ways. The photo at the left shows powder being blown into critical areas of aircraft engines to prevent corrosion during storage. Photo at right shows identical spring clips stored 3 weeks in an open box. The upper clip was first sprayed with 4% "VPI" solution. Note that the "VPI"-treated clip suffered none of the rusting which is apparent on the lower clip.

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By **PAUL A. KING**, *Attorney, Bigelow-Sanford Carpet Company, Inc. Member, New York Bar.*

HARD TIMES AHEAD FOR THE WSB • *Unless Congress changes its mind and throws more money its way* . . . . . **Page 236**

COMMIES ARE OUT IF YOUR CASE IS RIGHT • *You can get rid of a troublesome communist employee—but* . . . . **Page 236**

CRIME AND PUNISHMENT. *The big difficulty in this discipline case was defining the crime* . . . . . **Page 238**

WHO GETS THE NEW MACHINE? *Does seniority apply to assigning workers to new models of machines? Here's an arbitrator who says yes* . . . . . **Page 240**

NO RUNAWAY FOR THIS RUNAWAY SHOP • *Employer ordered to deal with the union anyway. Cost plenty, too* . . . **Page 242**

DON'T MIX IN UNION MATTERS—IF YOU CAN HELP IT • *You may get hurt—despite your good intentions* . . . . . **Page 242**

BAD NEWS FOR WAGE-CONTROL VIOLATORS. *Regional Enforcement Committee penalties may be raised by the National Committee* . . . . . **Page 244**

IGNORANCE OF THE FACT MAY BE AN EXCUSE • *Non-union member doesn't have to be familiar with terms of a contract* **Page 244**

BRIEF BUT IMPORTANT • *WSB issues information on pension and profit sharing plan provisions . . . Brotherhood of Electrical Workers gets into trouble for racial discrimination . . . NLRB says you can't pay workers extra for crossing a picket line . . . Better find out if your state permits time off for voting . . . Here's a contract booklet designed for easy reference* . . **Page 246**

Hard Times Ahead for the WSB

Hard times are ahead for the Wage Stabilization Board unless Congress changes its mind and throws more money its way. Because of current budget cuts, the WSB is planning to develop more self-administering regulations, eliminate some regional boards, do away with the tripartite membership of regional boards, cut down the size of the Washington Board and staff (4 members per side instead of 6), reduce enforcement activities, and curtail education and information programs.

Looks like you'll have an even tougher time getting fast action from WSB than in the past.

Commies Are Out If Your Case Is Right

An employer has a legitimate kick if the mere presence of a communist employee interferes with plant production or employee morale. Under such circumstances, arbitrators as a rule will uphold the employer if he fires the communist.

However, here's a case where an arbitrator didn't uphold a discharge—because the employer didn't handle it properly. Moral: Be careful how you prosecute such cases.

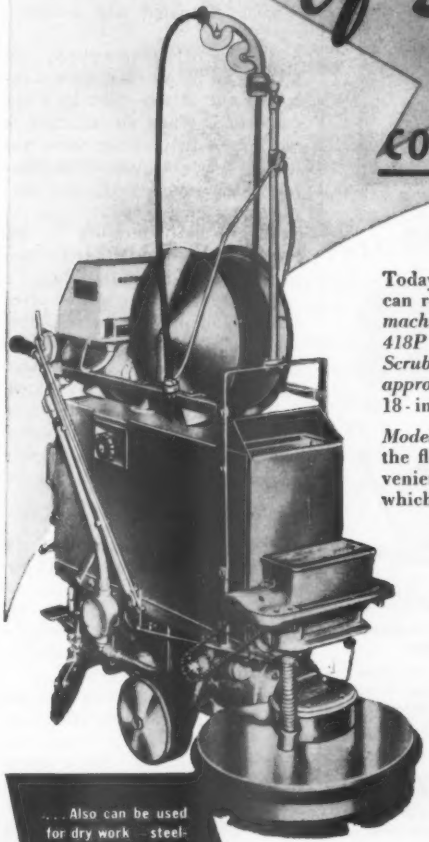
These are the facts: The chief steward in the plant refused to tell whether or not he was a communist when he was questioned

SMALL-AREA BUILDINGS...

Save 2/3 of Every Hour of Scrubbing Time

WITH A

COMBINATION SCRUBBER-VAC!



....Also can be used for dry work—steel-wooling, et cetera

Today, even buildings with but 2,000 to 15,000 sq. ft. of floor space can reap the labor-saving, cost-reducing benefits of *combination-machine-scrubbing.* Here's a *Combination Scrubber-Vac, Model 418P* at left, that's specially designed for such buildings. This *Scrubber-Vac,* which has an 18-inch brush ring, cleans floors in *approximately one-third the time* required with a conventional 18-inch machine and separate vac unit.

Model 418P applies the cleanser, scrubs, and picks up (damp-dries the floor) — *all in one operation!* Maintenance men like the convenience of working with this single unit... the thoroughness with which it cleans... and the features that make the machine simple to operate. It's *self-propelled,* and has a *positive* clutch. There are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs efficiently and quietly. (Powder dispenser is optional.) Compactly built, the *418P* also serves advantageously in larger buildings for the care of floors in narrow aisles and congested areas.

Finnell makes *Scrubber-Vac Machines* for small, vast, and intermediate operations, and in *self-powered* as well as *electric* models. From this complete line, you can choose the size and model that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that you can lease or purchase a *Scrubber-Vac,* and that *there's a Finnell man nearby* to help train your maintenance operators in the proper use of the machine and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2510 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

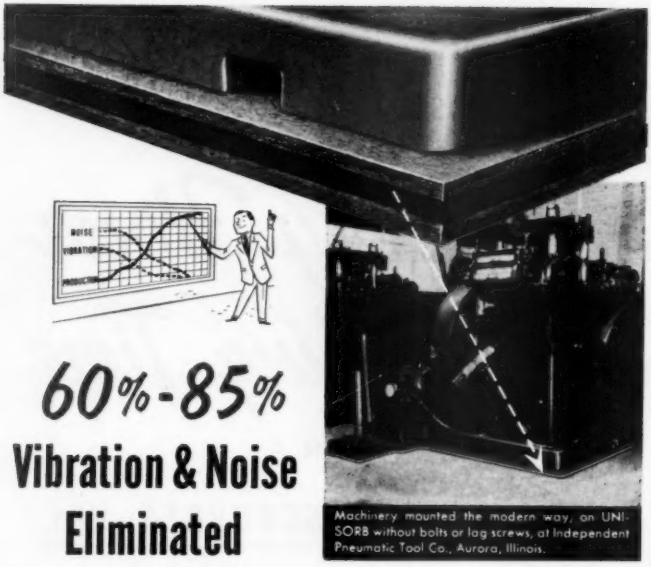
Conserve Manpower with Completely Mechanized Scrubbing

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES



60%-85%
Vibration & Noise
Eliminated

Machinery mounted the modern way, on UNISORB without bolts or lag screws, at Independent Pneumatic Tool Co., Aurora, Illinois.

When you mount machinery on...

UNISORB®

By eliminating transmitted machine vibration to a *proven* extent of 60 to 85%, UNISORB mounting prolongs building and floor life as well as the life of your machinery.

By considerably reducing the noise factor, UNISORB boosts worker morale and efficiency.

What's more, UNISORB requires no bolts or lag screws, makes old-fashioned floor drilling obsolete. A strong cement firmly bonds the UNISORB pads to machine feet and floor, with a holding strength of at least 90 lbs. per square inch.

Return the coupon today for complete information about modern machinery mounting.

UNISORB is also available pre-coated with adhesive, but is not recommended for use with machines that require shimming.

You Reduce
VIBRATION
NOISE
MAINTENANCE

with UNISORB Mountings

- no bolts, no lag screws, no holes to be drilled, no floor damage
- Felters adhesive holds for keeps, yet permits re-positioning of machines. (Our UNISORB Booklet tells you how.)

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210-A SOUTH STREET, BOSTON 11, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.

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MAIL COUPON FOR FREE BOOKLET TODAY!

Please send my free copy of the booklet containing the complete story of UNISORB Mounting.

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(Please Print)
COMPANY.....
STREET.....
CITY..... ZONE..... STATE.....

PRACTICAL LABOR RELATIONS

Begins on page 236

by the House Committee on Un-American Activities. When he came back to work, leaflets were circulated in the plant attacking the Congressional committee as a "smear campaign and a witch-hunt."

Because of threatened physical attacks on the worker, he was escorted out of the plant by plant protection. When he returned to work the following day there was a brief work stoppage. The company thereupon fired the employee as an undesirable on the grounds that literature in his name had been distributed in the plant and had made trouble.

Trouble was, there was no proof that this employee was responsible for the literature or its distrbution. So the arbitrator ordered the employee reinstated.

If the company had made a case that the employee's mere presence had caused the trouble, the discharge might have been upheld. (*Chrysler Award*)

Crime and Punishment

In settling disputes between employer and employee as to the fairness of penalties for rule infractions, arbitrators generally follow the principle that the punishment must fit the crime.

In a recent arbitration case, the employer thought the punishment fit pretty well—and so might you. But the arbitrator didn't agree. Here's what happened:

The employee in question carelessly permitted a piece of work to be snatched out of a chuck and get stuck in the lathe. The lathe was damaged to the extent of $1000 and was put out of commission for some time. Since this worker had been warned before about his carelessness, the company punished him by laying him

"LONG LIFE OF G-E IGNITRONS SAVES US HUNDREDS OF DOLLARS A SOCKET!"

Says

Arnold F. Weil, Chief Plant Engineer,
Solar-Sturges Mfg. Div.
of Pressed Steel Car Co., Inc.,
Melrose Park, Illinois.

"In several cases, our G-E ignitrons have been in operation more than three years. They've piled up work hours to twice or three times normal life. They have saved us many costly tube replacements, since we employ ignitrons extensively for welding, which is one of our main processes. Also, Solar-Sturges uses power tubes for induction annealing, and thyratrons and receiving tubes for control circuits. All these G-E types are dependable. They help us to keep machine outages at a minimum—another important factor in holding down our costs.

"General Electric tube service is prompt, and tube-maintenance counsel is available whenever we request it. We're more than satisfied!"

Electronic seam-welding seals the milk cans, waste receptacles, and metal cooking ware produced at Solar-Sturges—one of Pressed Steel Car Company's many factories for products ranging from auto bumper guards to complete railroad cars. G-E tube reliability helps to keep welder output high . . . maintenance needs and costs low.

● Get from your G-E tube distributor the benefits of (1) a long-lived, more dependable tube product, (2) fast deliveries out of local stocks, (3) tube-conservation help that will mean dollars saved through operating economies! Phone your distributor today! *Tube Department, General Electric Co., Schenectady 5, N. Y.*

You can put your confidence in—

GENERAL ELECTRIC

161-185

■ With Snap-on's Master set you're equipped for an exceptionally wide range of nut turning operations. The four Snap-on handles . . . Ratchet, Speeder, Spinner, Sliding Bar . . . with three extensions and universal joint, provide the utmost in wrench flexibility, speed, power . . . save time on straight-away jobs . . . quickly reach and turn difficult and "hidden" nuts. Supplied with full range of socket sizes, 7/16" to 1¼".

In thousands of plants Snap-on wrenches are used for production, assembly and maintenance. Write for the Snap-on Industrial Catalog, and general catalog of 4,000 Snap-on hand and power tools.

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8044-J 28th Avenue, Kenosha, Wisconsin

Snap-on Tools
THE CHOICE OF BETTER MECHANICS

*Snap-on is the trademark of Snap-on Tools Corporation

PRACTICAL LABOR RELATIONS

Begins on page 236

off until such time as the lathe was fixed. What could be fairer? it thought. Why lay off some less senior employee down the line because there was one less machine to be worked?

The arbitrator disagreed, ruled that the punishment did *not* fit the crime. He reduced the penalty to one week suspension.

He reasoned that if some other worker had been equally careless but was not so unlucky as to have the work slip into the lathe and damage it he would not have been penalized by an indefinite lay-off. The crime was carelessness—not damaging the lathe. (*Downington Iron Works Award*)

■

Who Gets The New Machine?

Have you ever noticed how your office workers cast a buzzard-like glance at the new equipment left behind by an employee who is leaving your company? Before the departing employee has gone out the door, there may be a dozen requests for his or her recently purchased typewriter or posture chair.

It seems that factory workers are made of no sterner stuff.

As revealed in a recent arbitration case, a senior employee, working at a machine of early vintage, griped that he should have been assigned to a just-purchased newer model. His seniority entitled him to it—he thought, even though the rate on both machines was the same. He reasoned that he was dished out of a promotion. The arbitrator agreed with him. (*Medart Company Award*) However, that doesn't mean that this is the rule. Other arbitrators have ruled the other way in similar cases.

Turn the page

This addition to steam generating facilities at Olmsted Air Force Base, Middletown, Pa., is sided with panels of U·S·S 17 Stainless Steel. The building is shown above before installation of panels and at the right as it nears completion. Architect-Engineer: Gannett, Fleming, Corddry & Carpenter, Inc., Harrisburg, Pa. General contractor: R. S. Noonan, Inc., York, Pa. Stainless Steel panels fabricated and erected by H. H. Robertson Co., Pittsburgh, Pennsylvania.

Using lightweight, long-lasting, insulated building panels

Complete walls of U·S·S 17 *(Type 430)* Stainless Steel installed in 11 working days

MORE than 7,000 square feet of U·S·S 17 Stainless Steel insulated panels form the complete walls of this new building which is an addition to existing steam generating facilities at the jet engine overhaul line at Olmsted Air Force Base, Middletown, Pa.

These Stainless Steel panels were installed by a crew of eight men in only 11 working days. One group of four men removed the protective paper and drilled the panels, and a second group of four men removed the girts and bolted the panels into place.

Quick installation like this—*in any weather*—means much lower labor costs. And that's but a part of the dollars-and-cents advantage of using Stainless Steel panel construction.

In the long run, the durability and corrosion resistance of Stainless Steel walls, the light weight in comparison to conventional building materials, the low "U" value or heat transmission factor all indicate that the cost-per-year will be lower than many building materials that may have a slightly lower initial cost.

Best news of all is that U·S·S 17 Stainless Steel for walls is available *now* for use on your current projects. You can obtain it without CMP tickets for use on any authorized construction.

If you are planning a new factory or mill building, warehouse, power plant, service or office building, U·S·S 17 Stainless Steel deserves your careful consideration. If you'd like additional information, write for our book, using the coupon below. Remember, United States Steel only produces the Stainless sheet and strip from which panels of this type are made; the panels are fabricated by a number of our customers whose names will be sent you on request.

The 24" wide Stainless panels backed with 1½" Fiberglas insulation and a metal-coated steel inner plate are attached to the building's structural members by four ⅛" x 3" round-head Stainless Steel bolts.

United States Steel Company
Room 2804T, 525 William Penn Place, Pittsburgh 30, Pa.

☐ Please send me your booklet, "U·S·S 12, U·S·S 17 Stainless Steel Walls and Roofs for Industrial Buildings."

☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

Name ..... Title .....

Address .....

City ..... State .....

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NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

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Ansul Dry Chemical Fire Extinguishers are built to take unusual abuse. There are no plastic parts which can be easily broken. The cartridge and cartridge receiver are protected by a patented steel cartridge guard. And the extinguisher shell is fabricated of a heavy gage steel to prevent possible rupture due to abusive use.

Advanced engineering design allows this rugged construction without making Ansul Extinguishers unduly heavy. Inexperienced operators can handle them easily and can extinguish much larger fires than one would normally expect from novice fire fighters.

SEE PAGE 288

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Try our wipers for 90 days. Send a description of the wiping jobs in your plant along with the order. We'll engineer the correct wiper for your purpose from our 70 grades. If you don't save, tell us your costs for a typical 90 day use of your present wipers or shop towels and we will promptly refund the difference. Our experience with hundreds of industrial concerns indicates that you can expect savings up to 25% so, SEND YOUR ORDER NOW!

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PRACTICAL LABOR RELATIONS

Begins on page 236

No Runaway for This Runaway Shop

It's not hard to understand why few companies move their plants just to get away from a union. The penalty for such "runaway shops" is too great. This case illustrates it:

The Mount Hope Finishing Company of Massachusetts thought it would take a chance and ran away to North Carolina from the Textile Workers of America (CIO) in Massachusetts. The company lost. It found itself in North Carolina, but saddled with the same union.

In addition, the National Labor Relations Board trial examiner found the company guilty of an unfair labor practice, ordered it:

—to offer 600 employees discharged up North reinstatement at the Southern mill;
—to pay their moving expenses;
—to pay for time lost from the time of discharge to offer of reinstatement;
—to bargain with the union.

Don't Mix in Union Affairs

The safest rule for you as an employer to follow is: Keep your two cents out of union affairs. Once in awhile an employer doesn't and he gets into trouble —despite his good intentions.

For example: 5 old-time employees were unhappy about a pension plan agreed upon by the union and the company. They started a protest meeting. The union asked the employer to penalize these workers. The company did. It suspended them for varying periods.

A National Labor Relations Board trial examiner took another view of it. He held the employer was guilty of an unfair labor

a product's best friend and severest critic . .

The Jones & Lamson Comparator vigilantly guards the quality prestige of countless products throughout industry.

J & L Comparators inspect and measure all kinds of parts and products, ranging in size and variety from pen points to propeller shafts — from dental burrs to bottle caps. These precise optical instruments improve quality control and reduce scrap, by making inspection more accurate, more rapid and more economical.

WRITE TODAY

for Jones & Lamson's new booklet, "Comparators — what they are and what they do." In non-technical language, it describes the Comparator!

Jones & Lamson Machine Company
Springfield, Vt., U.S.A., Dept. 710-F

Gentlemen: Please send me your booklet, "Comparators — what they are and what they do."

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U. S. A.
Machine Tool Craftsmen Since 1835

COMPARATOR DIVISION, DEPT. 710-F

SLASH
Fastening Costs in Steel and Concrete with New Ramset FASTENING SYSTEM JOBMASTER

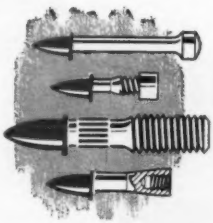
10 STAR VALUES increase ease, speed, utility and economy of proved RAMSET SYSTEM

Faster loading, one-hand operation with trigger action, hairline accuracy controls, shorter, more compact design and other important features make the new RAMSET JOBMASTER the unmatched tool for high-speed, low-cost, effortless fastening into steel, concrete and other approved materials.

On-the-job experience (not stop-watch laboratory figures) shows less than a minute per fastener from start to finish—faster on continuous work. Most jobs prove dollar savings up to 75%, time savings up to 90%. For almost any kind of construction fastenings, nothing sets like RAMSET!

Tru-Set Fasteners hit the spot

Guided by the exclusive, elasticized Red-Tip Pilot, Tru-Set Fasteners go straight to the work—penetrate and hold tightly at the exact spot designated. With 54 sizes and types of Tru-Set drive pins and threaded studs, you can select just the one you need for any specific job.



For new ease, new speed, new utility, new economy, ask your dealer today to demonstrate RAMSET JOBMASTER and Tru-Set Fasteners. Or, write us for details.

Ramset Fasteners, Inc.

Ramset Division, Olin Industries, Inc.

12117 BEREA ROAD • CLEVELAND 11, OHIO

Product Patent No. 2470117. Other Patents Pending.

PRACTICAL LABOR RELATIONS

Begins on page 236

practice. An employer has no right to punish a protesting union member.

It didn't help this employer to point to a clause in the contract compelling him to discipline employees for anti-union activity on company time. (*Louis R. Miller*)

Bad News For Wage-Control Violators

You can't be sure that a penalty imposed by a Regional Wage Control Enforcement Commission is the last word. The national Commission may review the penalty on its own and decide it wasn't stiff enough.

It did just that in two recent cases. Sent both back to the Regional Commission, directing it to penalize additional violations that had been overlooked. (*In re Boz, In re Haskell Plumbing*)

Ignorance of Fact May Excuse Erring Worker

Ignorance of the law may not be an excuse, but sometimes ignorance of a fact may be. For example, an employee was fired for dues delinquency. The union contract had been amended during its term to include a union-shop clause. The employee was not a member of the union and didn't know about the new clause. His discharge was unjustified, said a National Labor Relations Board trial examiner.

If the employee had been a member of the union, his ignorance would have been no excuse. A union member, said the examiner, is bound by the constitution and by-laws of the union and the union contract, even if he never reads these documents. With a non-union employee it may be different. (*Air Reduction Co. Inc.*)

Turn the page

DRAVO HEATERS

Saved $530,000*

in mammoth new auto plant

*Compared with conventional steam system cost.

Half a million is important money in anybody's language—and it gets more important when it's SAVED instead of spent.

That's just what happened when a leading automobile manufacturer recently built a mammoth new body stamping plant, with over 600,000 sq. ft. of floor space, and with ceiling heights ranging up to 52-feet. Heat requirements, including fresh air tempering provisions, totalled 54,250,000 Btu. Lowest quoted price for a conventional steam boiler plant was $860,000. ACTUAL cost of a complete Dravo *Counterflo* Heater installation of 53 units was $330,000. These direct-fired warm-air heaters take care of all open-space heating requirements of the manufacturing area of the plant.

Bear in mind that these savings involved no compromise with heating effectiveness. The top-flight engineers responsible for selection knew how vital *comfort* is in keeping employes contented and promoting top output. They looked *first* for the finest in heating results . . . and *second* for economies. They found both profitably combined in Dravo Heaters.

Neither did this saving come from "cutting corners" in building the heater, but rather through the basic simplicity of method and equipment. Each of the oil-fired space heaters manufactures heat "on demand" to blanket its own assigned area with warmth. It also introduces fresh, tempered air into the building as needed. Modulating burner controls permit continuous operation and continuous air circulation. This minimizes temperature fluctuation, assures maximum comfort in all weathers, and conserves fuel—for when any section needs LESS heat, its unit burns LESS fuel. Units all have the Underwriters' Laboratories label. They can be converted from oil to gas, should the fuel situation make this desirable.

This spectacular saving has been duplicated on a lesser scale in thousands of smaller plants. If you are concerned with heating any new or old building, you owe it to yourself to find out how Dravo *Counterflo* Heaters are serving and saving for others . . . and how they can save both system costs and operating costs for YOU. Look in the yellow section of your phone book—or write us direct at Dravo Building, Pittsburgh 22, Pa., for Bulletin FG-52.

DRAVO

DRAVO CORPORATION

PITTSBURGH • CLEVELAND • PHILADELPHIA • DETROIT • NEW YORK • CHICAGO • ATLANTA • BOSTON

Sales Representatives in Principal Cities. Mfd. and Sold in Canada by Marine Industries, Ltd., Sorel, Quebec.

Export Associates: Lynch, Wilde & Co., Washington 9, D. C.

Here was a real finishing problem!

Run an abrasive belt over a right-angle stationary guide at 4000 feet per minute . . . smooth and polish a small, recessed area on thousands of precision-made automatic pistol stocks . . . *and still eliminate excessive belt breakage!* This was an actual problem that confronted one prominent manufacturer. Here's how Jewel Brand Abrasive Engineers helped solve it.

A small sample of scrap abrasive belting was picked at random from the plant waste barrel. This was carefully analyzed by experienced Jewel Brand Engineers. It was fully tested in terms of the type of product being finished and the material used. Then, basing their selection on the findings of the "Waste Barrel" Test combined with basic information on the job requirements, these same qualified engineers recommended a Jewel Brand Abrasive Belt that has not only eliminated excessive belt breakage but one that has consistently done a better job, faster and *at a lower cost.*

This is only one of many difficult finishing problems quickly and effectively solved by Jewel Brand Engineers. It could just as well be *your* problem . . . your plant . . . your savings! So whatever your finishing operation may be we urge you to make the easy, profitable "Waste Barrel" Test now. Simply cut out a letter-size sample of used abrasive belt . . . include the belt joint, if possible . . . and send together with completed coupon. We'll do the rest *at no obligation to you.*

ABRASIVE PRODUCTS, INC.
519 Pearl Street
South Braintree 85, Mass.

HELP me complete the Waste Barrel Test!
Enclosed is a sample of used belt from our plant.

NAME _____ POSITION _____

COMPANY _____

ADDRESS _____

TYPE OF PRODUCTS _____ MATERIAL _____

WE USE APPROXIMATELY _____ BELTS PER MONTH _____

BELT LENGTH _____ BELT WIDTH _____

PRACTICAL LABOR RELATIONS

Begins on page 236

BRIEF BUT IMPORTANT

► **20 questions and answers issued** by the Wage Stabilization Board take up provisions of pension and profit-sharing plans that conform to General Wage Regulation 2 and will be approved. They also take up non-conforming provisions which may not prevent approval. For your copy, write the WSB, Washington 25, D. C.

► **The International Brotherhood** of Electrical Workers (Local 35) violated Connecticut's FEPC laws by discriminating against 2 negroes says a Connecticut Court.

► **You can't pay employees** extra money for crossing a picket line, says the NLRB. It's interference. A trial examiner said it was lawful, since intention was to pay for extra work to be performed because of the strike. NLRB overruled him. (*Thompson & Co.*)

► **Now's the time** to look into your state's law about time off for voting and find out where you stand. Election day isn't far off. Twenty-six states permit time off to vote. Some of the 26 don't allow deductions. Hours off may vary from 1 to 4.

► **Employees** of the Southern Counties Gas Company of California can easily find specific provisions in their union contract booklet. The title of each section is printed on a black bar on the front cover. Each bar matches up with a black stain on the edge of the booklet at the page where that section begins.

Rolling Steel DOORS

Manually, Mechanically, or Power Operated

Illustrated below you see six Mahon Power Operated Rolling Steel Doors installed in the openings of a combination truck and rail shipping dock: The power operators are located inside with through-the-wall drives. A continuous hood over the roller shafts and operating mechanisms extends the entire length of the six truck openings. This is another typical installation where no other type of door would serve the purpose—because, the vertical roll-up action of a Rolling Steel Door eliminates overhead obstructions—occupies no usable space inside or outside the opening. All-metal construction provides permanence, greater security, and assures you a lifetime of trouble-free service. When you select Rolling Steel Doors, it will pay you to compare both specifications and price tags . . . you will find that the hot-dipped galvanized curtain slat material that goes into Mahon Rolling Steel Doors is chemically cleaned, phosphated and treated with a chromic acid solution to provide paint bond, and that the protective coating of synthetic enamel is baked on at 350° F. prior to roll-forming. This is just one of the extra value features of Mahon Rolling Steel Doors. See Sweet's Files for complete information including Specifications, or write for Catalog G-53.

THE R. C. MAHON COMPANY

Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Six Mahon Power Operated Rolling Steel Doors 18'-7" x 14'-0" installed in a new building built by the Austin Company for the Albion Malleable Iron Works, Albion, Michigan. Another Mahon Power Operated Door 17'-0" x 22'-0" is installed in a railroad opening in the end of this enclosed loading dock.

MAHON

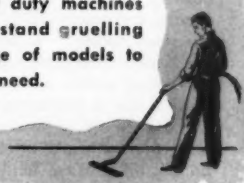
INVINCIBLE

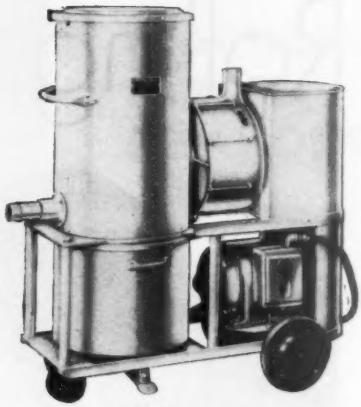
Vacuum Cleaners help keep plants Clean, Safe, Productive

Regardless of your business, dust and dirt in your plant can be removed quickly, thoroughly and at least over-all cost with Invincible Vacuum Cleaners . . . And a clean plant produces healthful and efficient working conditions.

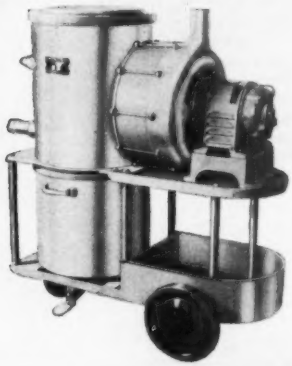
Invincibles are also contributing mightily to industrial progress by removing or reclaiming scores of industrial materials other than dust and dirt.

These portable heavy duty machines are designed to withstand gruelling service. A wide range of models to meet every industrial need.

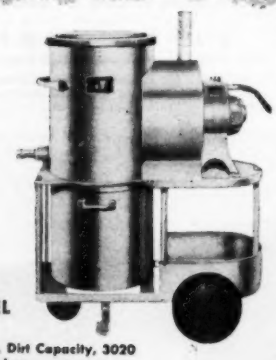




MODEL 809-B—5 H.P. Dirt Capacity, 3 cubic feet

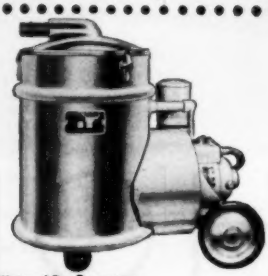


MODEL 460—1½ H.P. Dirt Capacity, 3020 cubic inches.



MODEL 450
1½ H.P. Dirt Capacity, 3020 cubic inches.

SEND FOR BOOKLET — It tells —
- . . . About the 100,000 Invincibles now in service
- . . . About our 40 years experience in this field
- . . . How Invincibles clean every spot in the plant
- . . . About the many materials reclaimed or removed



ALL SERVICE
½ H.P. Both Wet and Dry Recovery

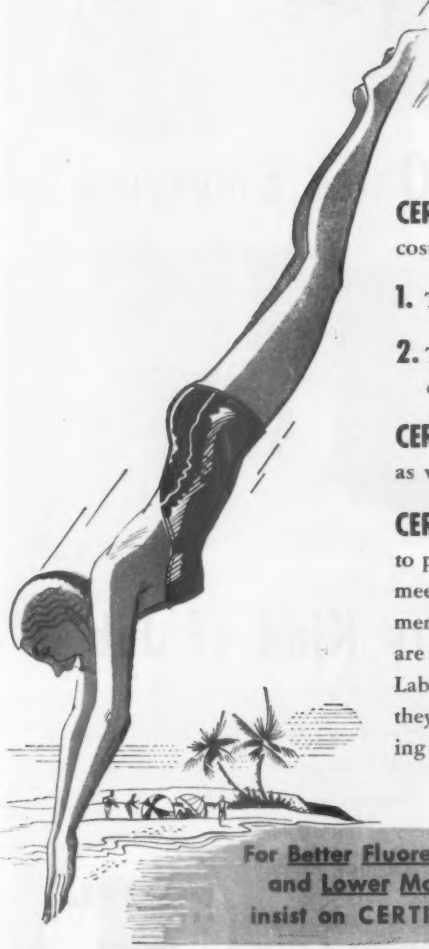
INVINCIBLE

Vacuum Cleaner Mfg. Co.

Dover, Ohio

Fluorescent Maintenance COSTS DIVE

when you use Certified Starters



CERTIFIED STARTERS reduce your fluorescent lighting costs in two ways:

1. They assure full life for the lamps.
2. They are made to provide at least 36,000 starting operations.

CERTIFIED STARTERS thus cut your maintenance costs as well as increase your overall lighting satisfaction.

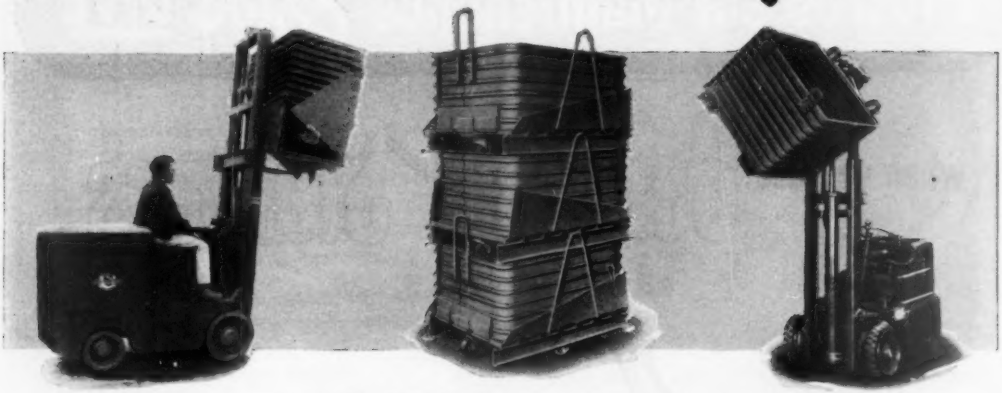
CERTIFIED STARTERS do this because they are made to precise specifications drawn up to meet the particular starting requirements of the fluorescent tube. They are then tested by Electrical Testing Laboratories, Inc., which certified they meet these rigid manufacturing specifications.

For Better Fluorescent Performance and Lower Maintenance Costs insist on CERTIFIED STARTERS.

Certified Fluorescent Starter Manufacturers

2116 KEITH BUILDING • CLEVELAND 15, OHIO

For Faster Materials Handling . . .



There's a POWELL Quick Emptying

Container To Fit Every Kind of Job

You can't beat quick emptying containers if you want faster materials handling . . . and you can't beat Powell when it comes to quick emptying containers. Pictured here are only a few of the many styles and types of quick emptying containers designed and built by Powell.

If this page gives you an idea for the speedier handling of your product, get in touch with the Powell representative in your area or write direct. Powell designs exactly what you need.

POWELL PRESSED STEEL Since 1920

THE POWELL PRESSED STEEL CO., HUBBARD, OHIO

ORIGINATORS OF ALL STEEL COLD FORMED MATERIALS HANDLING EQUIPMENT
(In Greater Youngstown)

for new high precision gaging . . .

NEW No. 955 Electronic Caliper

Now you can measure work-in-process as closely as .00001" — without removing the work from the machine or fixture, without lifting work from the bench. Apply the No. 955 Brown & Sharpe Electronic Caliper to the work and take your readings in units from .0001" to .00001" on the No. 950 Electronic Amplifier.

A measuring range from 0" to 4" is provided by four interchangeable jaws . . . only one master is required for any particular setting. For measuring long work pieces, an aligning attachment is available which provides a positive three-point bearing when caliper is applied to the work. A complete description of this precision caliper is given in the new Electronic Measuring Equipment Catalog. Write for it. Brown & Sharpe Mfg. Co., Providence 1, R. I.

Electronic Caliper with Aligning Attachment measuring long, slender work in grinding machine without disturbing work set-up.

WE URGE BUYING THROUGH THE DISTRIBUTOR

B·S

Brown & Sharpe

EXCLUSIVE FEATURES MAKE **MOBILIFT** BEST!

✓Lev-R-Matic Drive

Grouped 2-way PUSH-PULL levers give instant, finger-tip control . . . forward, back, elevating, and tilting. MOBILIFT multiple disc clutch insures smooth, positive action...THERE ARE NO GEARS TO SHIFT!

✓Mobil-Chain Lift

Controlled power, roller-chain-operated lift allows unobstructed view between uprights.

✓Mobilift's 3-Cylinder Heavy Duty Engine

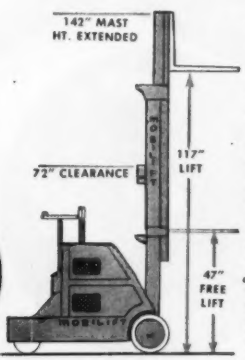
Air-cooled, compact, well-balanced and operates smoothly for long trouble-free service.

the MOBILIFT 6*10*

FORK LIFT TRUCK

- ***117" Lift...** Floor-to-Forks*
- ***72" Clearance***
- ***47" Free Lift***

MOBILIFT'S "*SIX-TEN*" solves a big problem when you need a fork-lift truck with *LOW* clearance and *HIGH* lift! The "SIX-TEN" gives you a *six* foot clearance and virtually a *ten* foot lift...floor-to-forks. The MOBILIFT "SIX-TEN" easily enters truck bodies and low clearance doors, yet *tiers 3 pallets high* . . . "SIX-TEN"— from 6 feet *low* to 10 feet *high*...floor-to-forks!



The "SIX-TEN" MAST is available on the versatile Model "E" 2,000-lb. capacity (outside turning radius, 57"; turns in inter-aisles, 53"; width overall, 33"; length, less forks, 64"), and also on the EW-2,500-lb. capacity.

The H (3,000-lb. cap.) and HW (3,500-lb. cap.) models with "SIX-TEN" mast have a **110"** lift floor-to-forks, **72"** clearance, **45"** free lift.

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MOBILIFT Lev-R-Matic DRIVE

MOBILIFT CORPORATION

835 S. E. MAIN ST., PORTLAND 14, OREGON

2317 W. 18th, Chicago • 790 Patterson Ave., E. Rutherford, N. J. • 2724 Taylor St., Dallas

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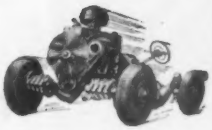
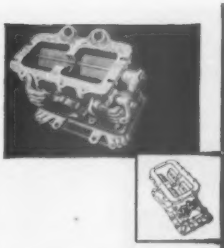
Ever see a helicopter grit its teeth?

When this helicopter's giant blade spins, tiny two-inch Lycoming gears—machined to tolerances of 1/10,000 of an inch—carry the load!



"Sinews" to give cars "go"

For any or *all* engine parts—pistons, transmissions, crankshafts and other essentials that can "take it"—leading auto manufacturers look to Lycoming.



Watch a plane's "lung" take a deep breath

To inhale 30,000 pounds of air an hour, an engine needs good lungs—the Lycoming fuel-injection body that never leaks or coughs at any speed or altitude.

LYCOMING PRESENTS

a representative group of its achievements considered of outstanding importance by America's military and industrial leaders

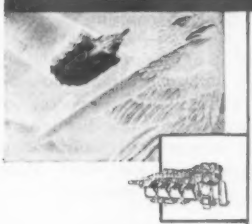
For a more complete story on Lycoming write—on company letterhead—for the booklet "Let's Look at Lycoming."

Here, through the eyes of a leading American illustrator, Lycoming demonstrates how it is geared to meet the most exacting requirements of America's leading industries. From basic research to precision and volume production, Lycoming offers a versatility of skills, extensive facilities and well-rounded experience. *Whatever* your problem—look to Lycoming!

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME-MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

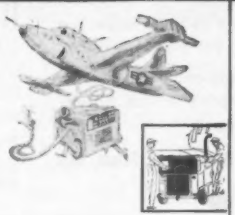
LOOK TO **LYCOMING** FOR RESEARCH FOR PRECISION PRODUCTION

LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
BRIDGEPORT [illegible] DIVISION, AVCO MANUFACTURING CORPORATION, STRATFORD, CONN.



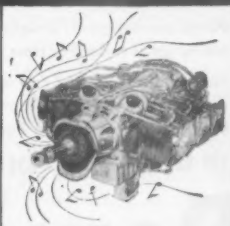
There's a new "beat" in this eagle's heart

Ready *reserve power* is an outstanding advantage of this sturdy new Lycoming aircraft engine—the only 400-horsepower air-cooled model produced today.



Hot "juice" for cold jets

This light, compact, portable Lycoming generator provides dependable all-weather starting power for jets—from 135° above to 65° below F.!



Its "song" fills the air

For dependable air-cooled engines in a wide horsepower range, many of the nation's leading aircraft manufacturers look to Lycoming!

AMERICA'S LEADERS LOOK TO LYCOMING

AIR MATERIEL COMMAND
BEECH AIRCRAFT CORPORATION
BELL AIRCRAFT CORPORATION
BENDIX AVIATION CORPORATION
CESSNA AIRCRAFT COMPANY
CHEVROLET-AVIATION ENGINE DIVISION
DETROIT TRANSMISSION, DIVISION OF GENERAL MOTORS
DOMAN HELICOPTER COMPANY
FORD MOTOR COMPANY
GENERAL ELECTRIC COMPANY
INTERNATIONAL BUSINESS MACHINES CORPORATION
NAVY BUREAU OF AERONAUTICS
OTIS ELEVATOR COMPANY
PHILCO CORPORATION
PIPER AIRCRAFT CORPORATION
PRATT & WHITNEY AIRCRAFT
RYAN AERONAUTICAL COMPANY
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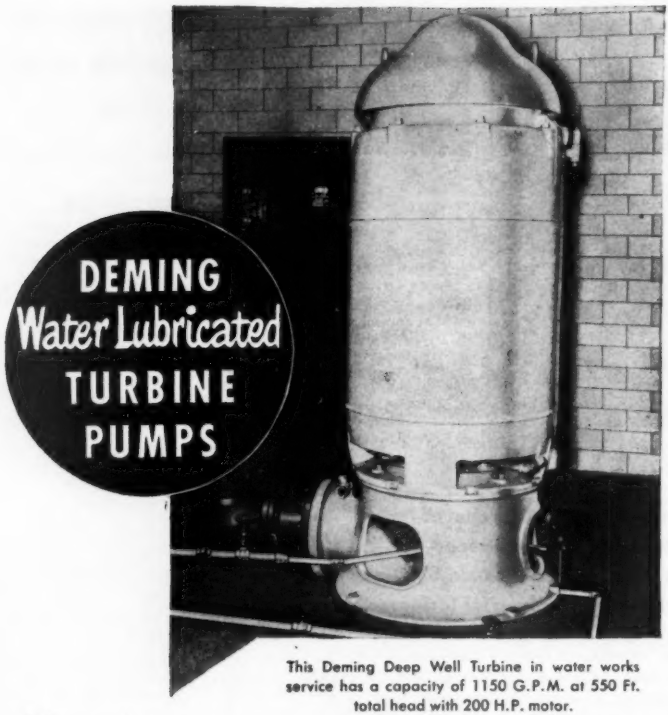
ILLUSTRATIONS BY ARTZYBASHEFF



This Deming Deep Well Turbine in water works service has a capacity of 1150 G.P.M. at 550 Ft. total head with 200 H.P. motor.

Adaptable TO A WIDE RANGE OF APPLICATIONS

There are three principal components in Deming Vertical Turbine pumps. These are the Drive Assembly, the Column and Shaft Assembly, and the Bowl Assembly.

Those three principal components are manufactured in a wide range of standard sizes for quick assembly into almost unlimited combinations to meet specific conditions.

Unit drive head is furnished where electric power is available. Auxiliary drives are available to meet various requirements.

Write for Bulletin No. 4700 which gives you detailed information about Deming Vertical Turbine Pumps.

Pumps are designed for wells 4" to 16" or larger in a full range of capacities from 15 to over 3500 G.P.M.

For dependable, low cost operation and maintenance in water works pumping service, *Specify Deming Vertical Turbine Pumps.*

THE DEMING COMPANY • 530 Broadway • Salem, Ohio

Deming

DEPENDABLE PUMPS

Use the coupon on page 153 or 260 to get these important

Free NEW CATALOGS

Begins on page 153

MATERIALS HANDLING

8 Industrial Trucks
An 18-page catalog covers the latest engineering and operating features of several models of electric-powered industrial trucks. Pallet, platform, riding, straddle, and counterbalanced types included. Photographs, specs, engineering drawings, maintenance data. Catalog No. 34. Lewis-Shepard Products Inc.

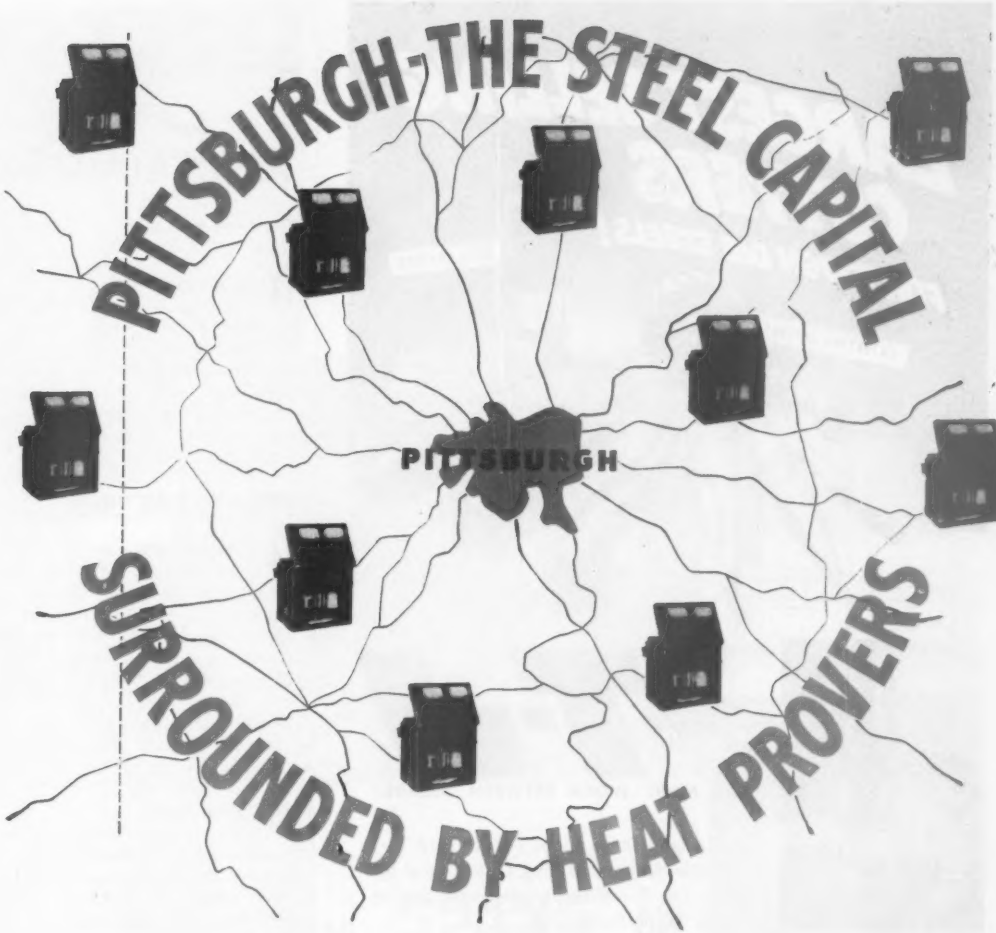
9 Fork Truck
Specifications, operating data, and dimensions of maker's new fork-lift truck are subjects of this 4-pager. Truck is 4000-lb. capacity at 24-in. load center, comes in diesel and gasoline powered models. Bulletin No. 1581. Buda Co.

10 Shelving
"The Science of Economical Shelf Storage" is title of this 16-page catalog on rotary shelving to store parts, tools, and materials. Outlines advantages and features, describes full line of rotary bins. Catalog No. 110. The Frick-Gallagher Mfg. Co.

11 Steel Strapping
This 24-page catalog is made up of pictures stories showing a variety of applications for industrial strapping—parcel post to carload storage. Sections on maker's strappings, tools, and accessories. Gerrard Steel Strapping Div., U. S. Steel Co.

12 Elevating Tables
A series of five bulletins gives features, specifications, and uses for portable hydraulic elevating and sheet feeding tables. Bulletin Nos. 232, 233, 262, 263, 264. The Raymond Corp.

Turn the page



When your eye is on Pittsburgh—and three dozen towns in its orbit—you're spotting scores of furnace operations regularly checked by Cities Service Heat Provers. Here, where they know all kinds of furnace instruments, and where high efficiency is most urgent today, the application of Heat Provers by Cities Service is increasingly valued.

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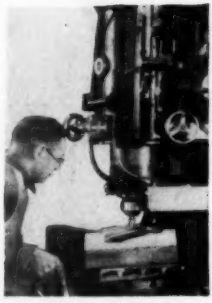

This T-J Cutter at work on a connecting-rod die block for a board drop hammer. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.

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In die and forge shops everywhere . . . T-J Die Sinking Milling Cutters are today's top favorites . . . because they're "tops" in performance!

You can raise the feed . . . they're *extra sturdy* for cutting tough die steels! Designed for speed, accuracy and long life . . . T-J Cutters hold a sharp edge longer on job after job . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated, accurately ground. Wide range of styles and sizes . . . *right* to increase the output of your machines and *reduce costs!* Send for new catalog 150. The Tomkins-Johnson Co., Jackson, Mich.

T-J FOR TOUGH JOBS

TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS

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Free NEW CATALOGS

Begins on page 153

13 Conveyors
Catalog No. 2478 serves as a guide to the selection and application of a line of oscillating conveyors. Included are dimensions and specifications of stock components and a chart showing conveyability of various materials. Link-Belt Co.

PIPELINES & FITTINGS

14 Molded Cups
Molded cups for pump pistons, hydraulic service, and pneumatic equipment are subjects of this 6-page bulletin. There are illustrations of the various types of cups, service data, and a complete list of sizes and part numbers. Application information included. Bulletin No. AD-145. Garlock Packing Co.

15 Ring Seals
A 16-page catalog gives comprehensive data on the manufacture and application of rubber ring static and dynamic seals. Groove machining information for various applications are listed in chart form. International Packings Corp.

16 Valves
Here's a series of 17 dimensional data sheets on a line of valves for fluid control. Complete valve dimensions on maker's models. Hoke Inc.

17 Couplings
In this 4-page bulletin (No. 2200) there's complete data on features, advantages, and uses for flexible, crowned bolt couplings. Information on construction, horsepower ratings, speeds, and selection. De Laval Steam Turbine Co.

Turn the page

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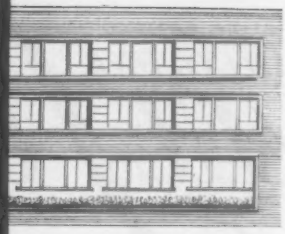

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In winter, as well as in summer, Atlanta's Red Cross blood bank *must* keep functioning. So Red Cross Officials selected materials for the heating system of their new headquarters building with extra-care—and placed their faith in reliable Spang CW for piping needs.

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Free NEW CATALOGS

Begins on page 153

18 Flexible Couplings
A full line of flexible metal couplings for power transmission is described in this 78-page catalog. Couplings are grouped and indexed according to use for quick reference. Specs, selection information, installation data. Catalog No. 51. Thomas Flexible Coupling Co.

19 Flexible Metal Hose
Corrugated, convoluted, and stainless steel varieties of flexible metal hose are shown in this 32-page catalog. Included are complete specs and information on coupling types and special assemblies. Flexonics Corp.

AIR HANDLING

20 Dust Filters
Bulletin No. 102 is an 8-pager that tells you all about a cloth screen dust filter for venting continuous dust creating operations. Tells how it works, how it's made, and where to use it. Specifications and solution of typical dust problem. W. W. Sly Mfg. Co.

21 Industrial Heaters
Specifications and dimensions of all models in a full line of direct-fired heating units are in Catalog No. NGC-10-52. Outlines features, shows applications, describes operation. 8 pages. Thermobloc Div., Prat-Daniel Corp.

22 Conveyor Belt
There are construction features, maintenance and selection data in this 8-page bulletin on conveyor belt. Describes the full line of maker's belt, gives specifications and useful technical information. Barber-Greene Co.

Turn the page

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several factors are important: the weight of the tool . . . speed under load . . . balance . . . ease of handling . . . power requirements . . . cost of maintenance.

But most important of all is the *work productivity* of the tool.

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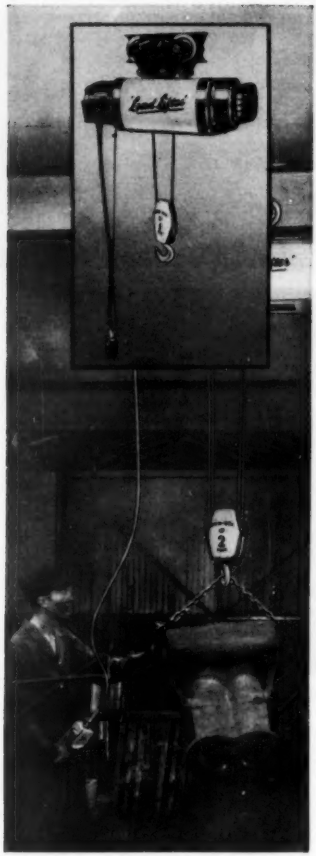

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Keep your production at high levels around the clock. Put this heavy-duty 'Load Lifter' on the job. Push-button control with only 24 volts at the push button, wipes out muscle strain, increases safety, and maintains worker efficiency. Simple design and rugged construction assure long life in the severest service. Capacities: 1,000 pounds upwards. Single and two-speed control available. Bulletin No. 399 contains all the facts. Write for a copy.

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IMPORTANT NEW Free CATALOGS

Begins on page 153

MISCELLANEOUS

23 Fluorescent Fixtures
A collection of bulletins on a full line of fluorescent lighting fixtures tells what's available in equipment and how to make best use of it. Installation information. 108 pages. Smithcraft Lighting Div.

24 Wire Cloth & Filter Cloth
In this 130-page catalog you'll find: information on selection and uses of wire cloth and filter cloth: a description of maker's fabrication service; and a useful technical data section. Catalog No. 50. Multi-Metal Wire Cloth Co., Inc.

25 Plastics for Maintenance
"157 Ways to Use Plastics for Maintenance" is title of this 16-page catalog. Lists and illustrates a variety of industrial uses for many plastics, describes maker's fabrication service. Cadillac Plastic Co.

26 Vacuum Cleaners
Heavy duty portable vacuum cleaners for industry are the subject of Bulletin No. 102-H. Describes features of cleaners from 3 to 15 horsepower, including standard electric, belt, and gas-driven vacuum units. Spencer Turbine Co.

27 Fasteners
This handbook of fastening specialties contains 22 pages of data on industrial fasteners for metal to metal and metal to wood applications. Tells how to select, where to use, and how to install. Southco Div., South Chester Corp.

28 Hardfacing Alloys
You learn how to use a line of hardfacing alloys to prevent wear in this 12-page manual (No. 77). Gives characteristics of available alloys, suggests applications. Wall Colmonoy Corp.

For catalogs 29 through 47 see Plant Engineering Problems, page 262, and Plant Operating Problems, page 266.

DUPLICATE COUPON ON PAGE 153

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FACTORY MANAGEMENT & MAINTENANCE (October 1952)
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40	41	42	43	44	45	46	47					

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"PAYLOADER" tractor-shovels have made outstanding records in thousands of plants by reducing the time, labor and cost of handling all kinds of bulk materials. They scoop-up, carry, dump and stockpile materials . . . lift, push . . . spot and unload box cars . . . handle coal and ashes and do many other cost-cutting chores. They take over slow, laborious jobs and do them faster, easier and cheaper — releasing manpower for more productive work.

Every "PAYLOADER" is a complete Hough-built tractor-shovel *designed specifically for tractor shovel work.* Multiple reverse speeds, large pneumatic tires and other features insure fast, low-cost performance over floors or unpaved ground, in congested areas, up or down ramps. The "PAYLOADER" is sold by a world-wide Distributor organization with complete service facilities. The Frank G. Hough Co., 755 Sunnyside Ave., Libertyville Illinois.

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Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

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NEED TO MAKE FAST CHANGES IN CONVEYOR CHAIN to meet fast changes in production? You'll be interested in the advantages of standardized attachments that can be quickly made to meet your conveyor needs. Hollow chain pins do the trick. Acmor Conveyor Chain Co. describes it in Bulletin No. HP-1. *(Circle No. 29 on coupon, page 153 or 260.)*

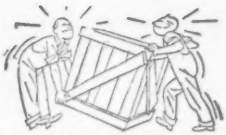
DOES YOUR RE-CIRCULATED AIR HAVE "B. O.?" Or your exhaust process air? You can freshen them with activated carbon equipment for air recovery and purification, says Aerotrol Engineering Corp. Bulletin No. 15-C tells how it works, what it can do, when you should use it. *(Circle No. 30 on coupon, page 153 or 260.)*

TO SPEED UP APPLICATION OF MASTICS such as roofing materials, coatings, caulking, and insulation, why not try a mechanical dispenser. Lincoln Engineering Co. has a line of power-operated equipment that it describes in Catalog No. 40. *(Circle No. 31 on coupon, page 153 or 260.)*

ARE FILTER BAGS ON YOUR DUST COLLECTOR CLOGGING with moisture condensation? Thermal insulation of ducts and collector may stop it. Gustin-Bacon Mfg. Co. suggests its Ultralite glass fiber insulation. Comes in rolls, easy to fit to any surface. *(Circle No. 32 on coupon, page 153 or 260.)*

IS YOUR DEEP WELL CASING CORRODING? That's when you should look at M-2 plastic pipe, says Yardley Plastics Co. It's especially suitable for all pure or corrosive

If two or more people must strain or heft



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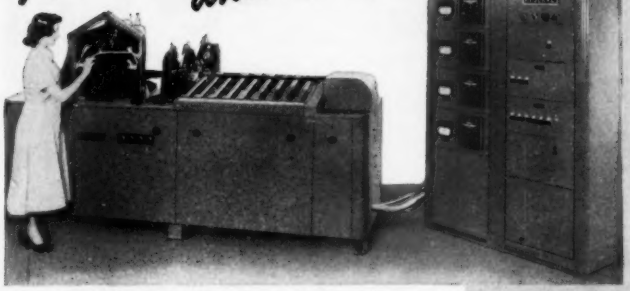
Automatically and at High Speed



At a speed of 3,000 plus per hour this conveyor-fed multi-inspection gage measures and sorts piston pins for hardness, triangular out-of-round, taper and diameter along the full length of the workpiece. The pins are automatically sorted into ten disposal units: out-of-round, tolerance .00005"; taper, tolerance .0001"; hardness, O.K. and "bad"; diameter, five groups of .0001" difference, plus over and under.

The final inspection of mass-produced, similar parts is automatically accomplished by Federal Gaging and Sorting. Federal Automatic Gages reduce non-productive inspection time, effect substantial savings in subsequent assembly, and eliminate useless machining of outsized pieces finally discarded as scrap.

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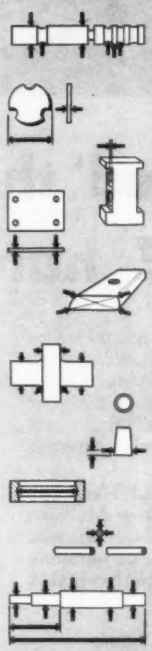

A few of the many dimensional inspections possible with automatic and sorting gages.

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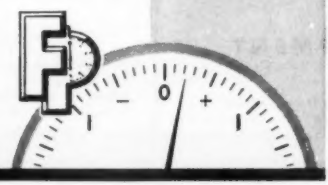

Begins on page 262

Good Ways to Solve Special

PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 153 or 260.

cold water uses where flexible, long lengths are desired. Use it above or below grade. *(Circle No. 33 on coupon, page 153 or 260.)*

TO KEEP ENTRANCE HALLWAYS CLEAN, you may want to put out the Ezy-Rug mat. American Mat Corp. says a full-time mat in front of entrances will trap abrasive and dry dirts, preventing them from entering the building. They do more damage than wet dusts, the company adds. *(Circle No. 34 on coupon, page 153 or 260.)*

HOW YOU CAN BUILD YOUR PARTITIONS FAST from materials in 50- and 150-ft. rolls: Use Vimlite, says Arvey Corp. It's translucent, semi-rigid, easy to cut to desired shape, and dustproof. Also controls humidity, heat, cold, and drafts. Form No. R-V-7-52. *(Circle No. 35 on coupon, page 153 or 260.)*

IF YOUR METAL BUILDING'S AN OVEN or refrigerator to your employees, depending on the season, you ought to insulate. "Insulations for Metal Buildings," an Owens-Corning Fiberglas Corp. booklet, tells how its Fiberglas insulation can reduce penetration of summer heat and prevent heat loss in winter. *(Circle No. 36 on coupon, 153 or 260.)*

TO CUT LABOR COST OF METALSMITHS, you can use flexible ducting. American Ventilating Hose Co. says it's quick and inexpensive to install, often requires no alteration when production lines are changed. It can easily be reclaimed, too. *(Circle No. 37 on coupon, page 153 or 260)*

MACHINERY MFR.'S FIRST CHOICE FOR 10 YEARS IS

STERLING SPEED-TROL!

Speed-Trols driving our Pony Mixing Units provide fingertip control of speed, permitting operators to more quickly, easily and accurately adjust mixing speed in any varying production or processing operation ... and, ten years of experience with Sterling Drives prove they are dependable and durable under the most rigorous duty, reports Sidney R. Klein of Herman Hockmeyer & Co., Bronx, millwrights and manufacturers of mixing machinery, conveyors and industrial equipment.

STERLING SPEED-TROL GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

EQUIPMENT ADAPTATION TO: Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

PROCESS CONTROL OF: Temperature — viscosity — level — pressure — flow — etc.

TIME CONTROL OF: Baking — drying — heating — cooking — pasteurizing — soaking — chemical action — etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality and profit.

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- **STERLING SLO-SPEED (GEARED) MOTORS**
- **STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS**

DRIP-PROOF • SPLASH-PROOF • TOTALLY ENCLOSED

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. A 103.

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Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile.
Offices and distributors in all principal cities.

with KEX wiping towels...

"I decided long ago to stop buying scrap rags and waste by the pound and switch to Kex wiping towels because a lot of the stuff we were getting wasn't usable. It had no uniformity and the men had to pick and choose the right piece for every job. That isn't true with Kex—every square inch is usable.

"After the first few months of using Kex Service my month-end cost for wipers was down substantially! The men have a uniformly-sized, absorbent towel for every job. And we don't run the risk of scratching or damaging delicate precision machinery."

YOU DON'T BUY A THING—just pay a low monthly rental. Kex towels are distributed nationally—for complete information, see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N.Y.

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It isn't Kex unless it's imprinted with the Kex name

Good Ways to Solve Special

PLANT ▶ OPERATING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 153 or 260.

IF YOU WANT TO DOUBLE ABRASIVE BELT LIFE, says Desmond Stephan Mfg. Co., you may want to try the new Desmond Beltbrasive Dresser. You get faster stock removal and less frequent belt changes, the company says. Bulletin No. D-12. *(Circle No. 38 on coupon, page 153 or 260.)*

FOR FASTER, MORE ACCURATE SET-UPS on a jig frame, you might consider optical tooling. Joel Fox Co., Inc., says its Align-A-Scope makes mechanical methods obsolete. Foolproof, easy to operate. *(Circle No. 39 on coupon, page 153 or 260.)*

BREAKING LOTS OF SMALL TAPS? The Finger Tip Chuck brings extreme sensitivity and precise control to small taps in high volume production, says Commander Mfg. Co. *(Circle No. 40 on coupon, page 153 or 260.)*

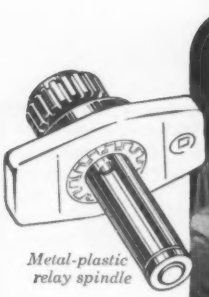
FOR YOUR REALLY TOUGH PROBLEMS in motion and control, why not put an electronic brain to work? Goodyear Aircraft Corp. has one called the L3 GEDA that spots inefficiencies in machines, methods, and materials. It can help establish flow patterns and improved automatic control systems. *(Circle No. 41 on coupon, page 153 or 260.)*

ARE GREASY PARTS CAUSING REJECTS? Randall Mfg. Co., Inc., tells how the Ramco vapor degreasers can be adapted to a variety of industrial cleaning problems and suggests types of equipment best suited to do the job. Brochure No. 6521. *(Circle No. 42 on coupon, page 153 or 260.)*

Turn the page

Keller Compression Riveters

give a squeeze ...not a wallop



Metal-plastic relay spindle

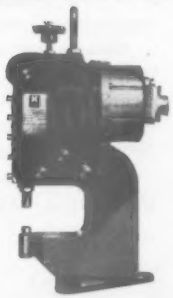
Reduce breakage when metal-plastic assemblies are forced into a pressure fit

Here is the experience of a Keller customer in manufacturing electric relay spindles, consisting of brass posts and pressure-fitted plastic collars.

Attempts to assemble by hand were slow, inaccurate, and costly. Staking the parts together with solenoid-operated power equipment had to be abandoned because the sudden, sharp impact shattered too many plastic collars and made breakage costs excessive.

The problem was solved when a tool engineer fitted Keller Compression Riveters with special lever arms. When the arms descend, the parts get an air pressure squeeze—not a wallop—and are pressed together firmly with little or no shock. Air power exerts maximum force at the end of the stroke, where it is most needed; and pressure is not released until the arm completes its full stroke.

Perhaps this characteristic of applied air power would save breakage and reduce costs in some of *your* plant operations. Have you discussed it with the Keller application engineer near you?

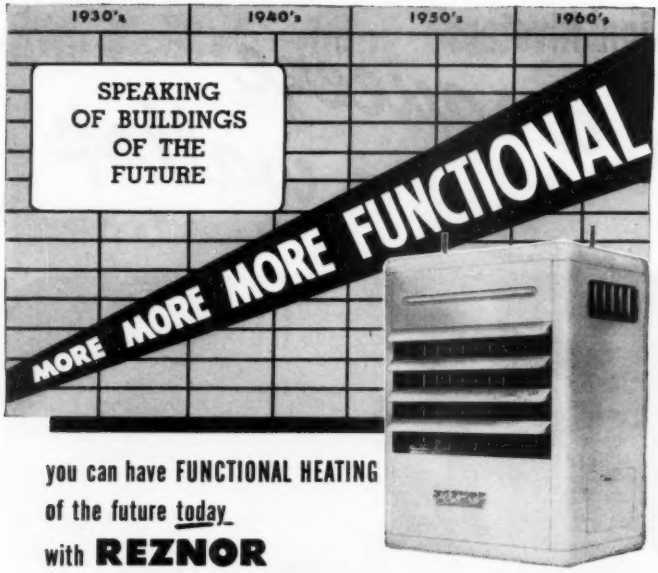


Keller yoke-type Compression Riveters may be used for pressing, crimping, or forming, as well as riveting.

KELLER

Pneumatic Tools

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

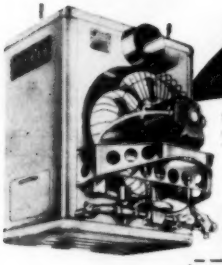


you can have FUNCTIONAL HEATING of the future today with **REZNOR** *Automatic* GAS UNIT HEATERS

● Housing an industrial operation is one of the vital cost factors that has spurred the trend of functional plant and facilities design. Heating fits into efficiency planning, too. Because the Reznor unit heater is basically functional it is your planning answer to heating efficiency for new construction, remodeling and expansion.

Reznors are installed at points-of-use; take a minimum of "out-of-the-way" space. By all standards they produce and distribute heat with highest efficiency. Installations require only hanging and connection of utilities and flue. Future rearranging is economical.

For contemporary functional heating, investigate Reznor unit heating. Write for detailed information.



REZNOR
WORLD'S LARGEST-SELLING GAS UNIT HEATER

MECHANIZED HEATING

A completely automatic, packaged unit in sizes from 25,000 to 200,000 BTU. Installed singly or in multiples as required. High efficiency due to balanced engineering of heat production, air movement and controls. Both floor and suspended models available.

SEE SWEET'S CATALOG FILE

Write for Catalog

REZNOR MANUFACTURING CO.
46 UNION ST · MERCER, PENNA.
Send me 20-page catalog in full color

Name_____
Firm_____
Address_____
City_____ Zone____ State____

Begins on page 266

Good Ways to Solve Special PLANT OPERATING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 153 or 260.

WHEN DIMENSIONING ERRORS UPSET PRODUCTION it's time to brush up on details of dimensioning. You can take—or give—a quick refresher course via Gisholt Machine Co.'s "Practical Dimensioning." *(Circle No. 43 on coupon, page 153 or 260.)*

HOW TO FABRICATE WELDED STEEL TUBING: That's the title of a new Armco Steel Corp. manual on the subject. Tells how to cut, deburr, bend, swage, form, punch and notch, drill, join, clean, and finish. *(Circle No. 44 on coupon, page 153 or 260.)*

TO CUT BOTH DRILLING COSTS AND TIME in drilling cored castings, Tilden Tool Co. suggests its new core drill. Feature of the cutting surface is circle of 8 tungsten carbide cutters. Drills are made in sizes of from ¾ inch to 4 inches in diameter, and up to 36 inches in length. *(Circle No. 45 on coupon, page 153 or 260.)*

HOW TO GET MORE OUT OF YOUR ABRASIVES: Carborundum Co. has 3 pocket-size booklets (Nos. 2, 3, and 6) that recommend applications for a variety of abrasive cloths, wheels, and other products. They can be used as operating manuals. *(Circle No. 46 on coupon, page 153 or 260.)*

ARE SMALL PARTS HARD TO HANDLE in finishing? A Clair Model 203-A Surface Finishing Machine uses a vacuum chuck arrangement to hold the small parts, allowing coverage over the entire surface. *(Circle No. 47 on coupon, page 153 or 260.)*

Fast Motor Service Wherever You Are

"Certified"

Factory approved motor service in every industrial area from 97 Allis-Chalmers Certified Service Shops.

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Saginaw—Banning Elect. Prod. Corp.

MINNESOTA
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Vicksburg—Ludke Electric Co., Inc.

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Kansas City—Boese-Hilburn Elec. Co.
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NEW HAMPSHIRE
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Cincinnati—Cincinnati Elec. Equip. Electric Service Co.
Akron—A-C Supply Co.
Toledo—Romanoff Elec. Motor Serv.
Youngstown—Winkle Electric Co.

OKLAHOMA
Miami—Miami Armature Works
Oklahoma City—Southwest Elec. Co.
Tulsa—Smith-Milligan Electric Co.

OREGON
Eugene—Kalen Electric & Mach. Co.
Portland—Milwaukee Mach. Co.

PENNSYLVANIA
Johnstown—Universal Elec. Mfg. Co.
Osceola Mills—Mid-State Elec. Eng. Co.
Philadelphia—Elec. App. & Repair Co.
Pittsburgh—Penn. Elec. Coil Corp.
York—Industrial Electric Company

SOUTH CAROLINA
Greenville—Southern Elec. Serv. Co.
Spartanburg—Southern Elec. Serv. Co.

SOUTH DAKOTA
Sioux Falls—Electric Motor Repair

TENNESSEE
Columbia—Middle Tenn. Arm. Wks.
LaFollette—Standard Arm. Works
Memphis—Indus. Elec. & Supply Co.

TEXAS
Amarillo—G. E. Jones Elec. Co.
Beaumont—Elec. Mach. & Repair
Dallas—Industrial Elec. Equipment Co.
El Paso—B & M Machinery Co.
Fort Worth—Central Electric Co.
Houston—Ray A. Berentz Co.
Sweetwater—Sweetwater Electric Co.

UTAH
Salt Lake City—Diamond Electric

VIRGINIA
Richmond—Wingfield & Hundley
Roanoke—Virginia Armature Co.

WASHINGTON
Spokane—Lee F. Austin Company

WEST VIRGINIA
Charleston—Charleston Elec. Supply
Fairmont—Central Elec. Repair Co.

WISCONSIN
Baraboo—Utility Transformer Equip. Co.
Green Bay—Beemster Electric Co.
Milwaukee—Dietz Electric Co.
Wausau—Electric Motor Service
Wisconsin Rapids—Staub's Elec. Wks.

ALLIS-CHALMERS CERTIFIED SERVICE SHOPS are independent service shops which have met rigid standards for ability, experience, equipment and business integrity. They use factory approved methods and parts and do your work promptly at a fair price.

Of course, Allis-Chalmers Certified Service Shops give good service on any electrical equipment, of any make. Tear out this ad and save it, or write the name of the A-C Certified Service Shop nearest you in your address book. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3864

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

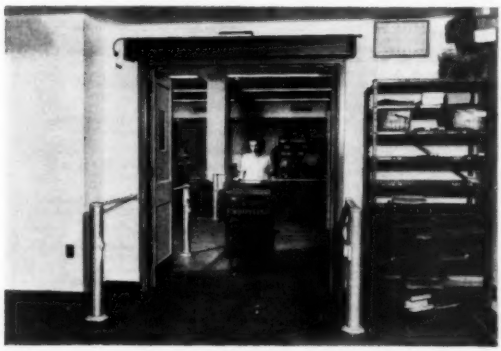
PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

Employees PREFER to work at the READER'S DIGEST plant!

. . . where newly-installed STANLEY MAGIC DOOR CONTROLS simplify the many handling tasks . . . help attract and hold high-grade personnel.

Carts move mountains of stencils in and out of addressing department through Stanley Magic Doors, actuated by photoelectric controls. Traffic flows smoothly and quickly because . . .

Doors open on approach, stay open until passage is clear, then close quickly and silently. Noise from machines is kept out of surrounding departments.



Costly spilling avoided—Stanley Magic Doors don't bang or rub against the carts and overturn stencils, mixing them up. Time is saved . . . employee morale preserved.

No damage to doors or carts because there's no contact between them. Maintenance and repairs are minimized. The work of opening and closing doors is eliminated.

The Stanley Works, Magic Door Division
30010 Lake St., New Britain, Conn.

Gentlemen: ( ) Please send full information on Stanley Magic Door Controls. ( ) Have your representative call.

Company Name _____

My Name _____

Address _____

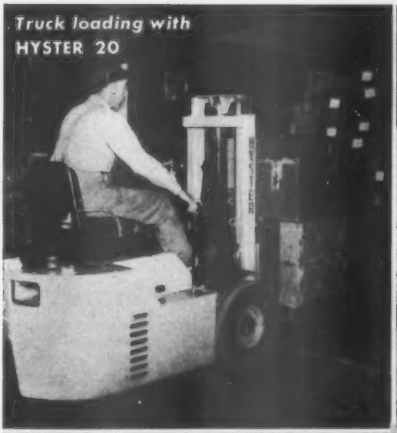
City _____

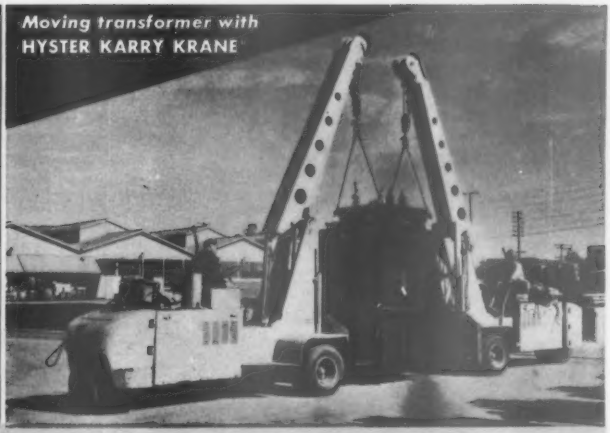
State _____

STANLEY® *Magic Door* CONTROLS

STANLEY TOOLS • STANLEY HARDWARE • STANLEY ELECTRIC TOOLS • STANLEY STEEL STRAPPING • STANLEY STEEL

If your plant uses conditioned air, remember that correct temperature and humidity are easier to maintain with Stanley Magic Door Controls. Available in many types for varied applications. Years of dependable operation in hundreds of plants have proved their long-term efficiency. Ask for complete facts about installation on your present doors, whether they swing, slide or fold. Send the coupon now.


Truck loading with
HYSTER 20


Moving transformer with
HYSTER KARRY KRANE

Car loading with
HYSTER 20

HYSTER®

will move your loads faster, cheaper, better

BUSY AS BEAVERS—hoisting, transporting—speeding production, cutting costs—that's the everyday Hyster work schedule in all types of industries.

MATERIALS HANDLING SUPERVISORS know that a Hyster unit transports fast, stacks high, gets in and out of tough places, rolls on pneumatic tires; is rugged, powerful.

OPERATORS know that Hyster lift trucks steer easily, lift and carry loads smoothly, take indoor and outdoor jobs in stride.

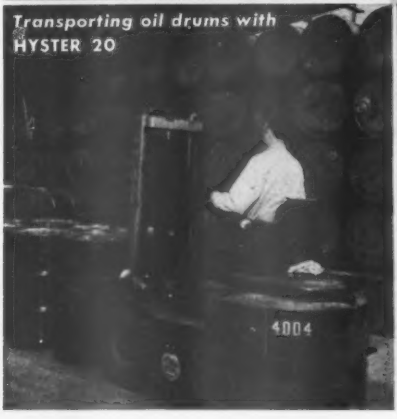
MANAGEMENT knows that Hyster trucks slash manufacturing and warehousing overhead and add to net profits.

Ask your Hyster dealer for a materials handling survey or list of owners.

HYSTER COMPANY

THREE FACTORIES

2956 N. E. CLACKAMAS STREET.....PORTLAND 8, OREGON
1836 NORTH ADAMS STREET.....PEORIA 1, ILLINOIS
1056 MYERS STREET.....DANVILLE, ILLINOIS


Transporting oil drums with
HYSTER 20

Stacking building materials with
HYSTER 40

ARO AIR TOOLS

Speed Assembly at AUTO-LITE

ARO Tools help Auto-Lite do scores of daily jobs of screw-driving and nut-setting . . . *faster and easier* . . . assembling parts for speedometer and other dash board instruments as well as recording thermometers and gauges and dial indicating thermometers at their LaCrosse, Wis., plant.

See your ARO distributor for an on the job demonstration, or write for new catalog 60.

The ARO Equipment Corp., Bryan, Ohio.
ARO Equipment of Canada, Ltd., Toronto, Ont.

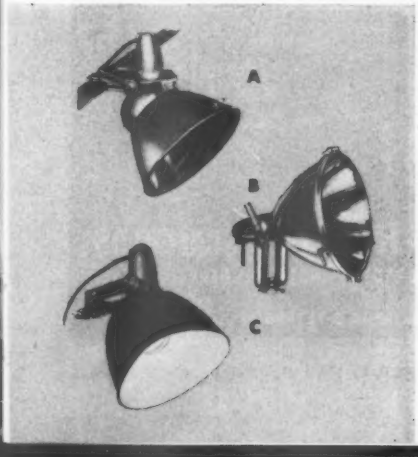
ARO *The Leader!* **AIR TOOLS**

Also . . . LUBRICATING EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

"DEAD STORAGE" AREA AT NIGHT . . . . . TRANSFORMED INTO ACTIVE MARSHALLING YARD BY G-E OUTDOOR INDUSTRIAL LIGHTING

Small investment in G-E lighting doubles value of outdoor work areas

A LIGHT FOR EVERY NEED is available from G.E.'s full line, for example: **A** High efficiency, lightweight, easy-to-install area floodlight for crossarm mounting, with three beam spreads; **B** Heavy-duty, wide variety of mountings and beam spreads; **C** Inexpensive, open floodlight for closer-range illumination.



You can use your plant's outdoor areas just as efficiently at night as you do during the day by adding outdoor lighting. And the cost of this productive lighting is insignificant compared to your present investment in outdoor work areas.

SPEED UP MATERIALS HANDLING

Tighter production schedules, congested plant facilities, and many other factors make it necessary for you to handle raw materials, parts, and products at night. With 'round-the-clock "daytime" provided by G-E outdoor lighting, fast, efficient materials handling is made possible, with a minimum of mistakes or damage. In the plant pictured you can see how an area, almost useless in the dark, became a productive asset.

PROTECT PERSONNEL, PLANT PROPERTY

The right outdoor lighting can pay big dividends in preventing accidents, pilfering and sabotage. But it is important to get lighting that serves your needs best—money spent on inadequate lighting is often wasted. To get more information on General Electric's full line of outdoor lighting for industrial plants, write for bulletin GEA-3640, to *Section 451-172, General Electric Company, Schenectady 5, N. Y.*

OUTDOOR INDUSTRIAL LIGHTING

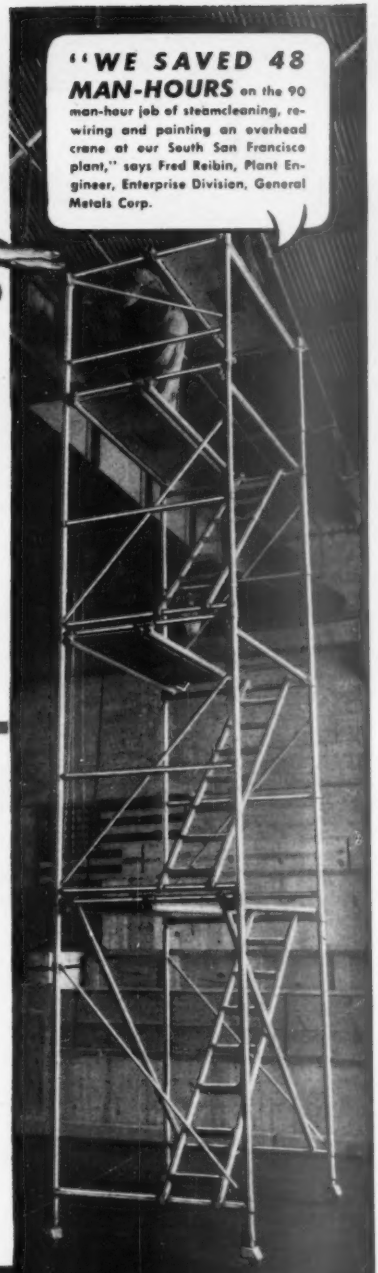
GENERAL ELECTRIC

"WE SAVED 48 **MAN-HOURS** on the 90 man-hour job of steamcleaning, rewiring and painting an overhead crane at our South San Francisco plant," says Fred Reibin, Plant Engineer, Enterprise Division, General Metals Corp.

25 ft. "UP-RIGHT" SCAFFOLD-ON-WHEELS

Set up in only 5 minutes!

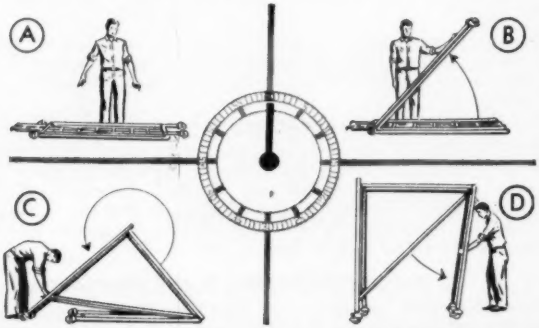
As if by magic, an aluminum alloy tower of any height desired is ready in minutes! Individual scaffold sections are set one on top of the other. Sections lock into place instantly. The tower rolls down aisles . . . straddles machinery.



HERE'S THE SECRET!...

Patented ONE-PIECE SECTIONS

Each one-piece section is unfolded by one man in less than a minute! No tools, wing nuts or bolts.



Your maintenance costs can be reduced by **"UP-RIGHT" SCAFFOLDS**

WRITE FOR DESCRIPTIVE CIRCULAR

"UP-RIGHT" SCAFFOLDS

DEPT. 104 • 1013 PARDEE ST. • BERKELEY, CAL.

OFFICES IN ALL PRINCIPAL CITIES

FACTORIES: BERKELEY, CALIFORNIA & TETERBORO, NEW JERSEY

PITT CHEM *Quality Control*

assures you better, longer-lasting protection

Pitt Chem quality-controlled Tar Base Coatings have an unmatched record of performance in protecting industrial structures and equipment from corrosion. They're easy to apply, low in cost and effective against a wide variety of chemical and atmospheric corrosive conditions above and below ground. And these tough, durable protective coatings have up to ten times the film thickness of ordinary paints and last for years under conditions that usually cause ordinary paints to fail in months.

You can depend on Pitt Chem Tar Base Coatings for top uniform quality because we control every phase of production from coal to finished coating—in a plant designed *exclusively* for the manufacture of tar base coatings. That's your assurance of top-grade application characteristics, uniform bond and maximum protection. ● More product information, technical data, or field application assistance will gladly be sent on request.

Write For FREE
Corrosion Control Booklet

Tells where tar base coatings can save you money in your plant . . . what grades to use . . . how to apply them.

W&D 4096

PITT CHEM 101
A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102
A thin, high gloss maintenance coating for steel and concrete surfaces.

PITT CHEM 103
A heavy duty coating for metal exposed to corrosive vapors, dilute acids and alkalis.

PITT CHEM 104
A fast drying, high gloss coating for equipment handling potable water.

PITT CHEM SYNTHETIC COATINGS

PITTSBURGH
COKE & CHEMICAL CO.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Now . . . Stop profits from being gobbled up by outmoded heating systems in your plant!

New THERMOBLOC Heating for Industry

Needs no costly pipes, ducts, radiators, installations. Direct-fired, self-contained Unit Heaters heat even coldest spots in minutes with less fuel! Ideal for large open areas, eliminates work-slowdowns due to cold corners. Thermoblocs are reducing costs, improving heat in hundreds of plants, warehouses, etc., today. See how Thermoblocs can solve the "profit-eating heating bill" in your plant, too!

How THERMOBLOCS

Cut Costs

Cost less to buy and install. Fully automatic, require no attendant. Heat circulates directly at working level, no fuel lost to high ceilings. Operate independently, start up only those units needed.

Give Ideal Heat

Forced circulation of live warm air assures instant, uniform heat even in large unpartitioned areas. High efficiencies assured, using gas or oil. Connect to fuel and power line and start heating. Beautifully styled.

Protect Equipment

Uniform, dry heat safeguards perishables, prevents rusting of delicate machinery.

For complete details on how to solve your heating problem, write for New Executive Bulletin on THERMOBLOC today.

THERMOBLOC DIVISION

PRAT-DANIEL CORP. Manufacturers of the well-known P-D Power Plant Equipment

17-10 Meadow St., S. Norwalk, Conn.

PRAT-DANIEL CORP.
17-10 Meadow St., S. Norwalk, Conn.

Gentlemen:
Please send me literature on how to save heating costs with THERMOBLOC.

Name _____ Title _____

Company _____

Address _____

Know anybody who's hankering for the "good old days"? Or griping about "inhuman treatment"? If so, ask him to read about the apprentice system in the first half of the 19th century.

Just as a historical sidelight, this story makes interesting reading. In addition, it's a pertinent and timely reminder of how far we've traveled in our human relations thinking since the days of our grandfathers and great-grandfathers.

Farmington, Feb. 14

BOY GONE OFF.

HIRAM CLARK, an indented boy of 14, (except in this instance always a good boy,) supposed enticed away by a brother of his, every one are hereby cautioned against employing, trusting or harboring said boy on penalty of the law. Five mills will be paid in hand for his apprehension and return.

STODDARD ELLSWORTH.

26

Hartford, Conn. Feb. 13

Dissolution of

THE business heretofore

RUNAWAY from the subscriber on the 16th inst. Ebenezer Smith jun. an indented boy to the Farming business, fourteen years of age, swarthy, large eyes, stockish, and very impudent. He wore a black coat, white vest, striped pantaloons, also a black great coat. Whoever will return him to the subscriber or give information where he may be found, shall recieve one mill reward, no charges paid. All persons are forbid harboring or trusting him on penalty of the law.

ISRAEL ALLEN.

East-Windsor, May 18, 1814.

74

THE hon. court of probate, for the district of

Newspaper advertisements like the two above (from the Connecticut Courant of 125 years ago) shed much light upon . . .

The Lot of the Learner

YESTERDAY AND TODAY

By HERBERT L. MATTHEWS

On May 31, 1814, a man named Israel Allen of East Windsor, which is seven or eight miles north of Hartford, put an advertisement in the weekly *Connecticut Courant*. It read:

> Runaway from the subscriber on the 16th inst., Ebenezer Smith, jun., an indented boy to the Farming business, 14 years of age, swarthy, large eyes, stockish, and very impudent. He wore a black coat, white vest, striped pantaloons, also a black greatcoat. Whoever will return him to the subscriber or give information where he may be found, shall receive one mill reward, no charges paid. All persons are forbid harboring him or trusting him on penalty of the law.

One mill, of course, is one-tenth of one cent, a coin that has long gone out of circulation and was at best the smallest amount into which American currency was divided. Mr. Allen was therefore being far from generous, but he did not have to be especially liberal because this

---

Herbert L. Matthews is on the editorial staff of *The New York Times*.

. . . for every type of work

Simonds makes all types of standard machinists' files . . . but Simonds only makes *one quality: Grade A.* And that quality is checked, safeguarded, assured by the Simonds "Prover Test"... so you can be sure that "Red Tangs" will cut instead of scrape . . . and that they unfailingly cut more smoothly, with less "elbow grease." That's why workers like them . . . why you'll find they can make your file dollars go farther. Order the Simonds "Red Tang" Files *you* need from your Industrial Supply Distributor today.

SIMONDS
SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Southern Service Shop in Meridian, Miss. (formerly J. H. Miner Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

INLAND 4®-WAY SAFETY PLATE

Safety pays off—in personnel, plant and product! You gain man-hours, lower insurance rates, greater fire protection and happier workers.

Each danger spot indicated above can be easily, quickly and economically made *safe* with slip-resistant 4-WAY SAFETY PLATE. It adds strength, traction and provides quick starts and stops.

Use 4-WAY SAFETY PLATE for sure footing on all danger spots in your plant and as standard equipment on your product.

Available from Leading Steel Jobbers
•
WRITE FOR BULLETIN F-1

INLAND STEEL COMPANY
38 SOUTH DEARBORN STREET • CHICAGO 3, ILLINOIS

INLAND

SALES OFFICES: Chicago • Davenport • Detroit • Indianapolis • Kansas City • Milwaukee • New York St. Louis • St. Paul

PRODUCTS: Sheets, Strip, Tin Mill Products, Bars, Plates, Structural Shapes, Sheet Piling, Reinforcing Bars, Pig Iron, Rails and Track Accessories

LOT OF THE LEARNER

Begins on page 276

apprentice, or "indented boy," was bound to him, body and soul, as if he were a slave.

I asked James J. Rush, who is in the fifth year of apprenticeship for the Newspaper Branch of the New York Typographical Union No. 6, what would happen if he decided then and there to quit his job.

"Well, this is a free country, isn't it?" he asked, meaning that if he wanted to leave the trade and *The New York Times* where he works, he can do so any time.

James Rush has to abide by his contract and his union rules—the hours of work, the kind of work, the pay, the agreement not to change employer without consent, the vocational training.

This is a far cry from the days when an apprentice contracted with a master "his lawful commands duly to obey," when he agreed not to get married during his apprenticeship, not to play dice or cards, not to frequent alehouses or taverns, not "to absent himself, by day or by night, from the service of his said Master, without his leave."

As little as 40 years ago a railway apprentice worked 10 hours a day, 6 days a week, at a dollar a week in his first period. James Rush has a 36¼-hour week, started with 50% of the full scale of wages. And now in his fifth year he is getting 85% of the $113 a week which is the basic minimum wage on the day shift.

The railway apprentice had no protection from sickness or accident, no opportunity for schooling, and had to sign a "Yellow Dog" clause agreeing not to join a trade union during and after his indenture term—all of which he rightly considered oppression and exploitation. Yet he was in the Seventh Heaven even then, compared with the apprentices of 130 years ago. Jim Rush, typographer's apprentice, can thank his lucky stars that this is not the early nineteenth century.

I realized that in going through

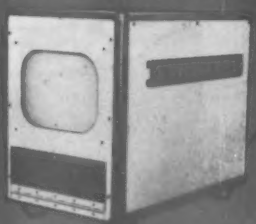
An employee who...

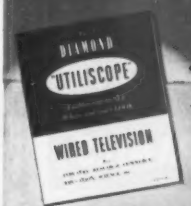
Requires no pay check
Never makes a mistake
Works 24 hours a day
Never takes a vacation

Many industrial operations that must be watched continuously and formerly required the individual attention of a man, are now being done without the man . . . by using a Diamond "Utiliscope" (Wired Television). The camera takes the place of the man . . . the monitor or receiver brings an exact picture of what is happening (as it happens) to a remote central control point or wherever else desired.

The "Utiliscope" is surprisingly low in cost. Its image is always clear and stable—it cannot transmit an incorrect image. It is on the job 24 hours a day, day in and day out, with practically no attention. The "Utiliscope" has no human limitations.

Let us tell you how the "Utiliscope" is now saving manpower, improving product quality, increasing production or preventing accidents. There probably is an application you can use to advantage. Write for Bulletin.





WRITE FOR BULLETIN 1025G

DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • *OFFICES IN 39 PRINCIPAL CITIES*
Diamond Specialty Limited—Windsor, Ontario
Since 1903, Diamond has Manufactured Quality Equipment For Industry

ROUND CALIFORNIA CHAIN CO.—
an important link in the nationwide Round Chain organization — is under the direction of J. D. Cavan, a Round veteran of 15 years. Like all other Round Chain Companies, Round California supplies a *complete line* of welded and weldless chain, slings, chain hoists, electric hoists, trolleys and winches. *Sold exclusively through wholesalers and distributors.*

J. D. CAVAN

LOT OF THE LEARNER

Begins on page 276

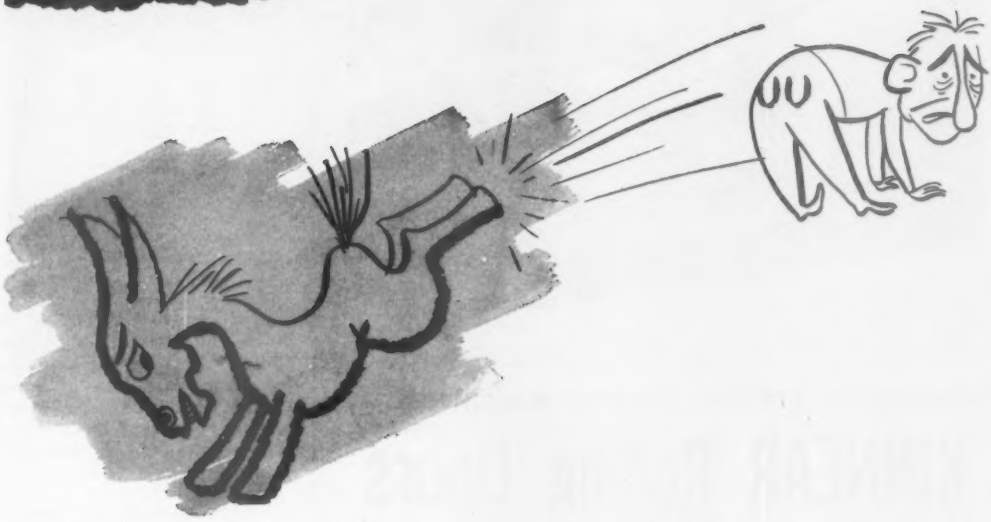
about 200 copies of the *Connecticut Courant* for the years 1814 to 1824. There are innumerable advertisements seeking to get back "indented" or "indentured" boys and girls who had run away, and some of them reveal more than volumes could tell us of the life of apprentices or bound servants in that so-called "Era of Good Feelings." The picture is by no means all bad, just as many slaves had decent masters and led happy lives. But, as an institution, the old indenture system was as wrong as slavery.

The word "indenture" comes from the fact that it was customary in England when a contract for an apprentice was signed to take two copies, put them together, and then tear off (i.e., indent) the top edge. The master kept one copy and the apprentice or his guardian the other, the authenticity of both copies being guaranteed by having exactly the same notch or "indenture."

More than one-half of the American colonists in the seventeenth and eighteenth centuries were indentured in some form or another, either pledging themselves in advance in order to get to the New World, or being sent there as transported convicts bound for seven years. They had to work for specified masters without wages for a term of years. Sometimes orphans and unwanted minors were sent and bound as apprentices, usually for four years.

They could be—and were—often sold, exactly like slaves. This was, in fact, the equivalent of what we call "slave labor" today. All through colonial times, indentured servants provided the principal source of American labor, but by 1814 (the time to which I am referring) our skilled craftsmen—carpenters, masons, shoemakers, tanners, tailors, blacksmiths, shipwrights, and the like—were independent workers who employed journeymen and

with Freight Elevators too...



DON'T DISCOUNT IMPACT

Today, freight elevators must be able to take extra-rugged punishment. The punishment of heavy, fast-moving, quick-stopping power trucks. Many-directioned impact-stresses on freight elevators when being loaded can cause severe strain on car structure and guide rails.

You owe it to your investment to get expert advice and an analysis of your particular problems.

Westinghouse engineers are trained in the planning, selection and installation of freight elevator-materials handling projects. Their recommendations will include the right number and type of elevators to contribute to the economical operation of your materials handling system.

For complete details regarding the selection and application of freight elevators, write for the book, "Buyer's Guide for Freight Elevators." This Guide should serve in preparing the solution to your vertical transportation problems.

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of four-month political campaign over CBS television and radio.

YOU CAN BE SURE...IF IT'S Westinghouse

J-98638

SEND FOR THIS BOOK TODAY

"Buyer's Guide for Freight Elevators." 46 informative pages on design, lifting capacity and size, layouts, etc.

Westinghouse Electric Corporation
Elevator Division
150 Pacific Avenue, Jersey City, New Jersey
Dept. M.

Please send me "Buyer's Guide for Freight Elevators" at no obligation.

NAME_____

COMPANY_____

TITLE_____

ADDRESS_____

The Missouri-Pacific Lines' new freight terminal at St. Louis — one of the world's most modern and efficient — is equipped with Kinnear Steel Rolling Doors and Kinnear Steel ROL-TOP Doors.

Where doors get their toughest assignments...

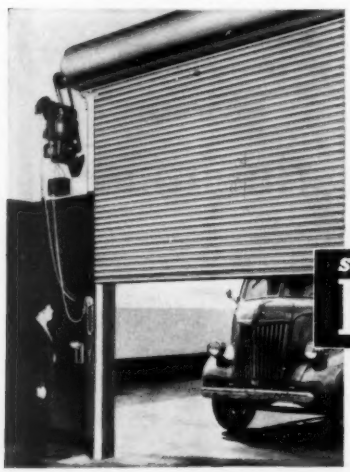
KINNEAR Rolling Doors

prove their extra value for every need

The advantages of Kinnear Rolling Doors *for all types of buildings* are proved by their performance in big installations like this — where doors are the very life-line of efficiency.

The coiling upward action of Kinnear Rolling Doors makes all floor and wall space around doorways fully usable at all times. Freight or materials can be stacked close to the door curtain, *inside and outside the building*, without blocking door action.

Opening completely out of the way above the lintel, the doors stay out of reach of damage by wind or vehicles. The interlocking steel-slat construction — *originated by Kinnear* — provides a rugged, all-metal curtain that assures long service and low maintenance, plus extra protection against fire, theft, and the elements.



Kinnear Rolling Doors are tailored to fit any opening, in old or new buildings. Kinnear Motor Operators are also available, for push-button control. Write today for complete information.

Saving Ways in Doorways

KINNEAR ROLLING DOORS

The **KINNEAR** Mfg. Co.

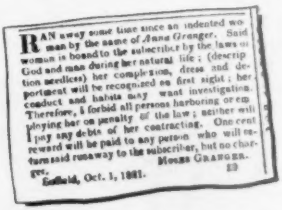
FACTORIES:

1540-60 Fields Avenue, Columbus 16, Ohio

1742 Yosemite Ave., San Francisco 24, Calif.

Offices And Agents In All Principal Cities

apprentices. New England especially relied on free skilled workers.



RAN away some time since an indented woman by the name of *Anna Granger*. Said woman is bound to the subscriber by the laws of God and man during her natural life; (description needless) her complexion, dress and deportment will be recognized on first sight; her conduct and habits may want investigation. Therefore, I forbid all persons harboring or employing her on penalty of the law; neither will I pay any debts of her contracting. One cent reward will be paid to any person who will return said runaway to the subscriber, but no charges.

MOSES GRANGER.

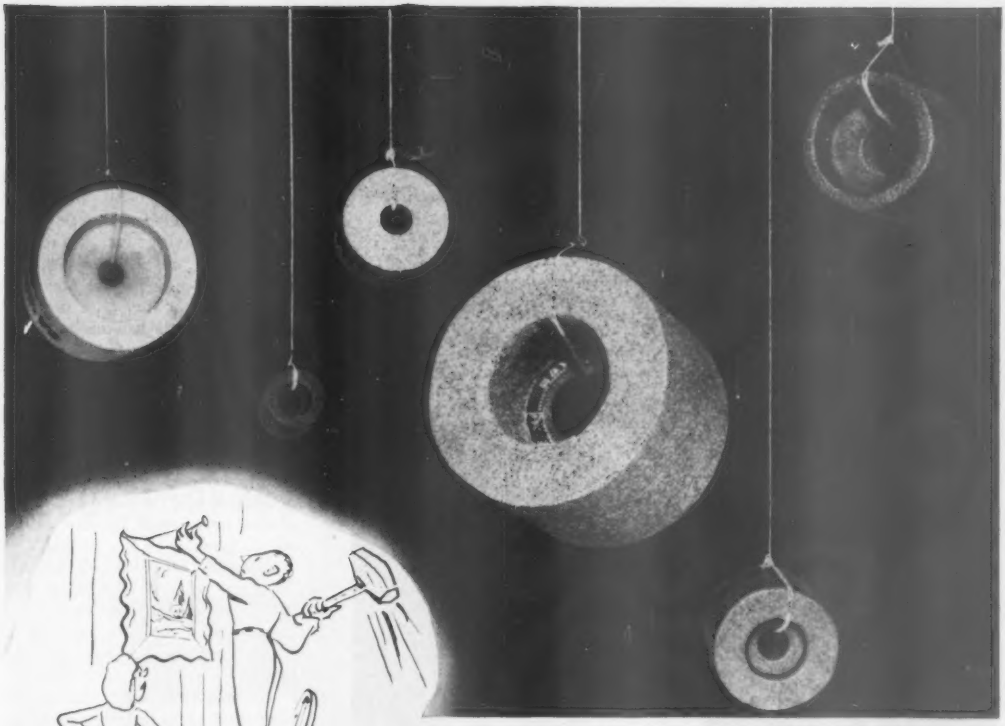
Suffield, Oct. 1, 1821.

However, if the masters were free, the apprentices were not. Of all the differences between then and now, that is the principal one. Take the case of Anna Granger and her master, Moses Granger, who most likely was a relative. Here is an advertisement that Moses inserted:

> Ran away some time since, an indented woman by the name of Anna Granger. Said woman is bound to the subscriber by the laws of God and man during her natural life; (description needless) her complexion, dress, and deportment will be recognized on first sight; her conduct and habits may want investigation. Therefore, I forbid all persons harboring or employing her on penalty of the law; neither will I pay any debts of her contracting. One cent reward will be paid to any person who will return said runaway to the subscriber, but no charges.
>
> *Moses Granger*
>
> *Suffield, Oct. 1, 1821.*

One hopes that Anna was never caught. Note that the unfortunate woman is bound by the laws of God as well as man, according to her master, "during her natural life." This would mean that she was a servant, although even indented servants normally worked for a term of years. The coarseness and brutality of the description are unusual. Odd descriptions were more common.

Turn the page



YOU COULD HANG PICTURES with a sledge hammer...

but . . . you shouldn't — nor should you use just any internal grinding wheel when you can use Bay State's . . . proven best in the field for the countless inside grinding jobs that call for speed and accuracy.

Deservedly popular, Bay State Internal Grinding Wheels are:

- **UNIFORM** — due to exacting standards of manufacture
- **TRUE-RUNNING** — because of accurate centering
- **LONG-LASTING** — because they fit-the-job, through the proper selection of grit and grade. (That's where Bay State engineering experts will really help you.)

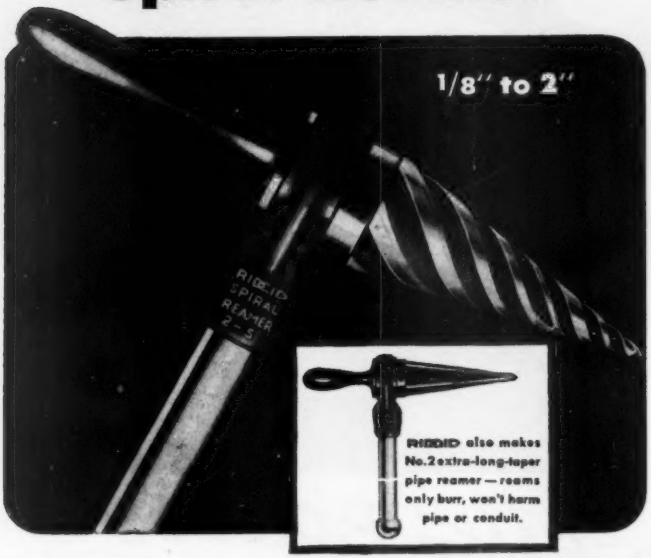
BAY STATE

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Mass.

Branch Offices and Warehouses —
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

BAY STATE'S current expansion program includes a new 250 foot kiln plus a 30% increase in plant capacity...this means better deliveries to you.

Announcing the NEW RIDGID Spiral Reamer



NOW fast easy reaming with the new RIDGID 2-S Spiral

★ Reams pipe fast, easily and cleanly.

★ Makes quick work of enlarging conduit box outlets—cuts holes in sheet metal, smoothly, no chatter. Reams soil pipe.

★ Special design blades feed into metal at lightest pressure, cut it like wax.

★ Typical RIDGID tested design, fine craftsmanship and materials—extra long service for your money.

★ Buy the new 2-S spiral at your Supply House.

Reamer unit sold separately—fits your RIDGID OOR threader handle

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

LOT OF THE LEARNER

Begins on page 276

There was John Judd, 17, who "looks as if he had been crying," and Erastus Waters, "an indented apprentice to the tanning and shoemaking business," who is described as having "rather a downcast look."

"A negro boy named Mose, 17 years old last May . . . has had one of his arms broken near the wrist." When there is such a deformity, the master is aware of the suspicion of cruelty. To disclaim such an imputation, he will often explain how the deformity occurred, such as the boy who is "badly scarred on his right arm and leg below the knee and other places occasioned by the burning of powder in his pocket."

Rewards vary from Israel Allen's one mill to as high as $20. But such figures are rare. One cent was a common reward, it being a purely nominal sum, *pro forma*.

The amount must often have depended on what the runaway took along with him. A $20 reward, for instance, was promised for John Flint, a 19-year-old apprentice to the hatting business, who "talks very little." He "wore away a black coat and pantaloons, black silk vest, a London smoke surtout coat, and carried away many articles of cloathing."

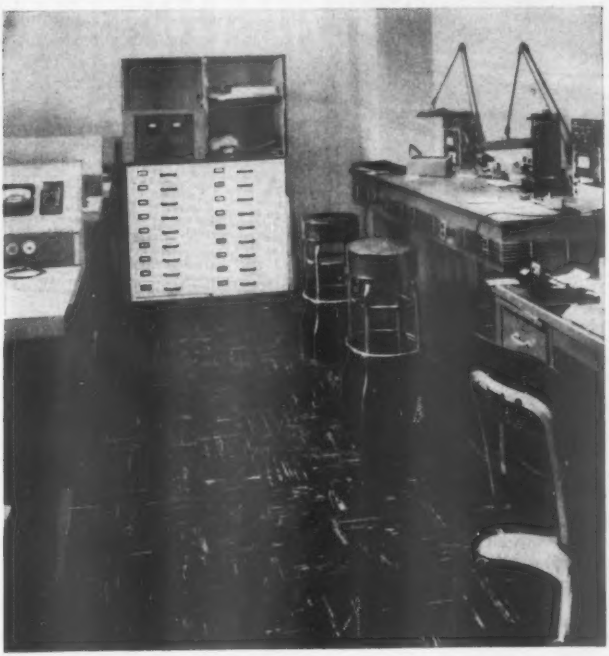
For real slaves (there were few of them in New England in those days) higher rewards were natural. One Joseph Hasbrouck offered $50 in June, 1814, for a Negro slave named "Lew or Lewis, about 25 years old, about 5 feet 7 or 8 inches high, very black, a long underlip, speaks low Dutch, and tolerable good English, and a low tone of voice."

It was customary to offer more for lost, strayed, or stolen animals than for runaway apprentices. Jeduthan Parkess, advertising from Stamford on June 8, 1814, for his 16-year-old indentured boy, Benjamin Thomas, who ran away, announced:

> Whoever will return him to the subscriber or give informa-

sometimes
the right choice
is obvious

...but it takes an expert to specify the right floors



SPECIAL *(greaseproof)* KENTILE *is an extra-rugged, greaseproof Flooring that resists industrial oils and greases, alkalis, alcohols and most acid solutions. It is ideal for laboratories like the one shown above, installations where food is prepared or served, garages and light manufacturing areas. Like Kentile,* SPECIAL KENTILE *cleans easily and economically... retains its modern colorful beauty even under the most rigorous conditions. And, it can be installed over any smooth, firm interior surface... even below grade over concrete in direct contact with the earth.*

THAT'S WHY IT PAYS TO CONSULT YOUR KENTILE FLOORING CONTRACTOR

THOUGH ONE floor may look much like another, the trained expert can see differences that may make an unwise selection impractical and inefficient... as well as excessively costly. That's why more and more flooring purchasers and specifiers are learning to rely on the trained judgment of the Kentile Flooring Contractor.

His advice and recommendations are directed towards helping you choose the one floor that's right for the area in question... the one floor that will give the longest service for the lowest cost... whether it be for heavily-trafficked hallways and assembly rooms or gaily colorful leisure areas.

To get the most for your flooring dollar, call on the Kentile Flooring Contractor. He's listed under FLOORS in the classified pages of your phone directory... or write: Kentile, Inc., Dept. TT-8, 58 2nd Ave., Brooklyn 15, N. Y. In Canada, T. Eaton Co., Ltd.

KENTILE INC.

KENTILE • KENRUBBER • KENCORK
SPECIAL *(GREASEPROOF)* KENTILE

KENTILE, INC., 58 Second Avenue, Brooklyn 15, New York • 350 Fifth Avenue, New York 1, N. Y. • 705 Architects Building, 17th and Sansom Streets, Philadelphia 3, Pennsylvania • 1211 NBC Building, Cleveland 14, Ohio • 900 Peachtree Street N.E., Atlanta 5, Georgia • 2020 Walnut Street, Kansas City 8, Missouri • 4532 South Kolin Avenue, Chicago 32, Illinois • 1113 Vine Street, Houston 1, Texas • 4501 Santa Fe Avenue, Los Angeles 58, California • 452 Statler Building, Boston 16, Massachusetts

how do your materials handling methods *Measure Up?*

An inventory of your materials handling methods might be profitable to you today. Are your methods of getting materials through production processes really modern methods? Are you getting finished products to storage or shipping via the best and most economical way? In other words, has your materials handling kept pace as you have grown and expanded your production?

A little time invested in a close look at your handling methods might save you many dollars. Possibly, being so close to your own everyday problems, you have overlooked some things that could be improved. Look over your operations again . . . and, if you see room for possible improvement, call in your nearby Mathews' Engineer. He'd like to help you to get better and more economical materials handling.

MATHEWS CONVEYERS

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA

PACIFIC COAST DIVISION . . *Mathews Conveyer Company West Coast*
SAN CARLOS, CALIFORNIA

CANADIAN DIVISION . . . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO

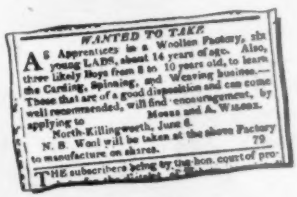
LOT OF THE LEARNER

Begins on page 276

tion where he may be found, shall receive one cent reward. He also took with him a small spotted Dog, black and white: whoever will return said dog shall receive one dollar.

A month or so later, $20 was offered for the return of "a large dapple grey horse," stolen from the pasture of Solomon Cowles of Farmington.

They got their apprentices young in those days, of course. Today, Typographical Union No. 6 will not take apprentices to the printing trade unless they are 18 or over. Jim Rush, a war veteran, began at 21 and is now 25 years old. But child labor was a commonplace in the United States until the turn of this century. Think of the lads who answered this advertisement of July 12, 1814:



WANTED TO TAKE

A Apprentices in a Woollen Factory, six young LADS, about 14 years of age. Also, three likely Boys from 8 to 10 years old, to learn the Carding, Spinning, and Weaving business.—Those that are of a good disposition and can come well recommended, will find encouragement, by applying to

Moses and A. Wilcox.

North-Killingworth, June 6.

N. B. Wool will be taken at the above Factory to manufacture on shares. 79

THE subscribers being by the hon. court of pro-

Wanted to take as apprentices in a Woollen Factory, six young Lads, about 14 years of age. Also, three likely Boys from 8 to 10 years old, to learn the Carding, Spinning, and Weaving business. Those that are of a good disposition and can come well recommended, will find encouragement by applying to *Moses and A. Wilcox.*

Twelve to fourteen is the most common age for runaway apprentices, which is understandable enough. What boy of that age wants to be tied down to the drudgery of hard work and to learning a trade in a strange house and often among strangers? This was "domestic apprenticeship," of course, long before the Industrial Revolution got going in the United States. Once indus-

Meet your B-RIGHT-ON *dealer*

Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

THE BRIGHTON SCREW & MANUFACTURING CO.

QUALITY B-RIGHT-ON PRODUCTS

Reading Road opposite Deer Creek

Cincinnati 2, Ohio

Extra Services and Plus Values

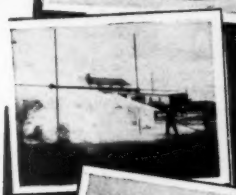
available without cost to users of

ANSUL

DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT

. . . . your Best Protection

FOR FLAMMABLE LIQUID, GAS AND ELECTRICAL FIRES



. . . HUNDREDS OF MEN,

representing practically every industry in America, have

RECEIVED SPECIAL TRAINING

without cost or obligation in

ADVANCED FIRE-FIGHTING TECHNIQUES

with all types of "Approved" Fire Extinguishing Equipment at the

ANSUL FIRE TRAINING SCHOOL

in Marinette, Wisconsin . . . the largest and best-equipped industrial fire-fighting facilities in America.

FRANCIS G. HOOD MEMORIAL BLDG, MARINETTE, WIS.

Send for File No. 102. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units. Included also is additional information on Ansul Fire-Training Schools.

MODEL 30-B

No. 1 of a series of 6

ANSUL Chemical Company

FIRE EXTINGUISHER DIVISION • MARINETTE, WISCONSIN

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES

ALSO MANUFACTURERS OF INDUSTRIAL CHEMICALS, REFRIGERANTS AND REFRIGERATION PRODUCTS

LOT OF THE LEARNER

Begins on page 276

try turned from the individual craftsman and artisan to the factory, the apprentices had to live in their own homes, and trade unions soon began defending their interests.

Back in the "Era of Good Feelings" a boy or girl made a blind date with destiny when parents indentured them to work and to learn a trade. No doubt many were lucky. In these advertisements I am discussing, the vast majority were not fortunate, since they felt impelled to run away. However, in many cases they must have been bad boys and girls running away from good masters. One feels somehow that the Stoddard Ellsworth who advertised on Feb. 13, 1821, for a runaway boy was a decent character. "Hiram Clark," he wrote, "an indented boy of 14 (except in this instance always a good boy) supposed enticed away by a brother of his . . ."

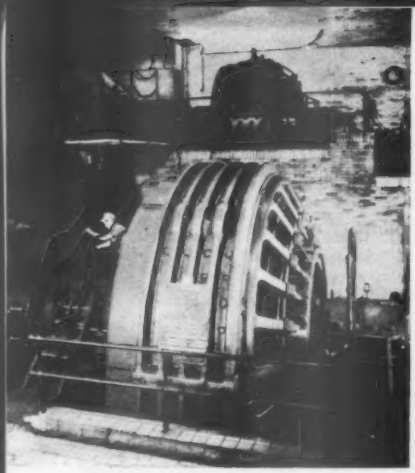
But one wonders what might have happened to the boy whose parents responded blindly to this:

> Wanted to do chores in a small family, a boy of about 12 years of age. He can have the privilege of attending school. One from the country preferred.

The "privilege of attending school" was, incidentally, a rare one in those days. Today it is universal. Young Rush, for instance, like all apprentices to the printing trade, goes for 8 hours each week to the School for Printers' Apprentices of New York. This is within his working hours, and half the modest cost of $50 a year for the course is met by the employer.

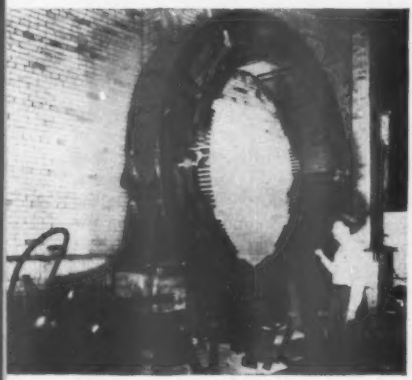
The point now is that an apprentice not only learns his trade but also is well paid to do so—and is a free citizen in the process.

One always gets back to that element of freedom and to the



Complete spares are kept for these key motors—a 7000-hp reversing-mill drive motor and the slabbing mill's 1650-hp d-c screwdown motor.

Wheeling Steel's equipment reconditioning program at Steubenville was planned by its superintendent in charge of operation and maintenance of electric equipment, James Farrington (right). Helping him are (right to left) George Merrick and Henry Ford, assistant superintendents, and (standing) Karl J. Doll, manager of the G-E Apparatus Service Shop in Pittsburgh.



Ready to replace any of 3 generators in the plant's main motor-generator set (already reconditioned) is this spare 2400-kw generator frame.

Motor pool comprises smaller spare motors, all reconditioned. Full information on each motor and its location is maintained in an equipment record system.

Standby renewal parts for electric equipment are kept in this storage room, one of several at Wheeling.

***Productive* Maintenance "kit"** contains helpful maintenance literature, plus "tools" that help sell management on need for full maintenance program.

Management is "Maintenance-minded" at Wheeling Steel Corporation

Here's how to develop management support for <u>your</u> maintenance program

Wheeling Steel Corp., of Wheeling, W. Va., shows what maintenance men can really do with full management support. "Our successful maintenance program," says J. H. McElhinney, operating vice president, "was devised and supervised by our maintenance department" and plays a major part in keeping output high.

To help *you* present your maintenance story to the top men in your plant, General Electric offers a new *Productive* Maintenance program. Its spearhead is a kit of maintenance information that helps you *prove* how Productive Maintenance can raise *your* plant's output. For your kit, contact your nearest G-E Apparatus Service Shop or write to General Electric Co., Section 801-8, Schenectady 5, N. Y.

GENERAL ELECTRIC

JOHNSON GP BEARINGS
ready made and precision finished
Over 850 standard stock sizes are available to you in Johnson GP (General Purpose) Cast Bronze Sleeve Bearings. This great range of sizes will meet at least 90% of your needs for production applications as well as your maintenance needs. They are cast in a high quality bearing alloy and precision machined to standard tolerances. Johnson GP Bearings are available at both Johnson distributors and warehouses.
JOHNSON BRONZE COMPANY
512 South Mill St., New Castle, Pa.
JOHNSON JB BEARINGS
Sleeve-Type

LOT OF THE LEARNER

Begins on page 276

thought that our country was built in part on the labor of slaves and also of indentured workers and servants. Even within the same family—as we saw with Anna and Moses Granger—it was not uncommon for one member to be indented to another. Here is a typical example:

> All persons are hereby forbid harboring or trusting Martin Burdick, an indented servant, as I shall not pay any debts of his contracting after this date.
> *Daniel Burdick, Master*
> *Burlington, October 2, 1815*

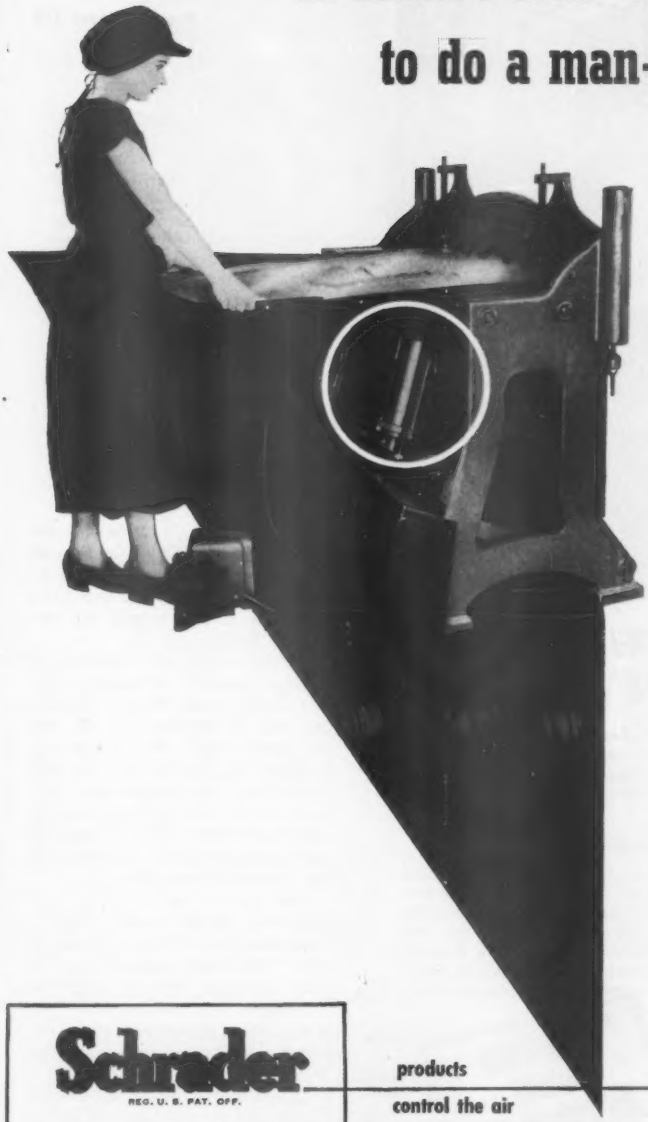
The classic example in our history, of course, is that of Benjamin Franklin and his elder brother, James, to whom he was indentured in 1718 at the age of twelve for nine years. The father paid James, who was a printer, £10 to teach the art of printing to Benjamin and to help meet the cost of his food, lodging, and other "necessaries."

Benjamin didn't like it, as he tells us in his autobiography. His brother, whom he concedes to have been a generally good but testy soul, beat him often, and even with the fraternal relationship was "tedious." Benjamin was only released from his indenture through a fluke, when his brother got into trouble and gave him a full discharge so that Benjamin could act nominally as the publisher of James's newspaper.

Generally speaking, there was no escape except to run away, and that explains the advertisements one constantly sees in the newspapers of the time—a procedure with the triple purpose of trying to get the apprentice or servant back, disclaiming all responsibility for any debts that the runaway might incur, and preventing anyone else from hiring or harboring him.

It was inevitable that the strains and stresses should now and then lead to terrible crimes. For instance, there was the case

It doesn't take a heavyweight to do a man-sized job



Before these shears were shifted to air operation the entire weight of a man was required on the foot treadle to cut the sheet metal.

All this is changed now. A light touch of the girl's foot on the pedal puts all the power of the Schrader Air Cylinder to work, sending the knife-edge through the metal.

This is just one example of how air cylinders can speed up production and reduce fatigue . . . one of many hundred applications of Schrader cylinders and valves. You can undoubtedly find many places in your shop where manual lifting, lowering, pushing or pulling is slowing up production.

To find out how Schrader air control products can be put to work for you . . . to boost production—lessen operator fatigue—increase safety . . . send us a letter outlining your particular installation, your idea or fill out the coupon below.

Schrader
REG. U. S. PAT. OFF.

products
control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Mail This Coupon Today

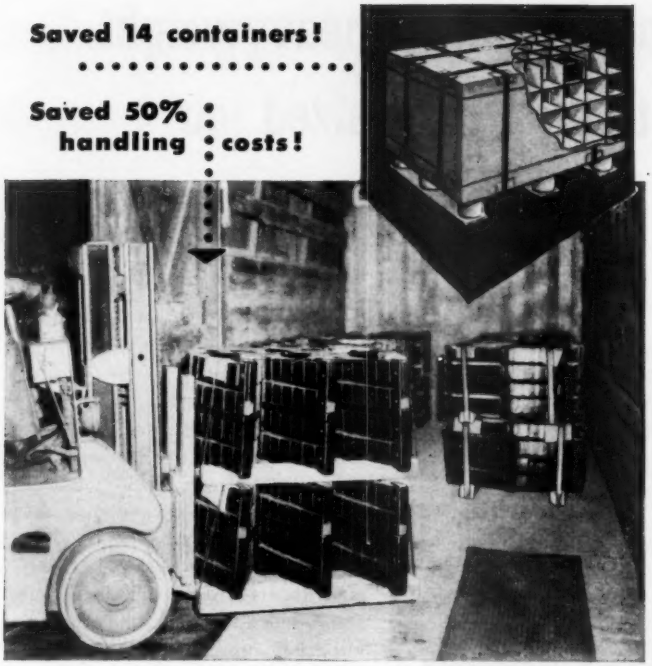
A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
457 Vanderbilt Avenue, Brooklyn 17, N. Y., Dept. N-3

I am interested in more information on.....

Name_____ Title_____

Company_____

Address_____



SIGNODE OFFERS YOU BETTER STRAPPING METHODS*

Even your "best" can be improved. A manufacturer of TV transformers formerly shipped 168 units in 15 cartons. Signode helped them work out a multi-unit package combining 175 units in *one*—bound into a compact pallet load with Signode steel strapping. This application was easy to work out but . . .

this one was a toughie!

Diesel springs, heavy and unwieldy, formerly were shipped loose in railway cars. At the point of assembly, each of eight component parts of the spring had to be handled separately. Signode, with the foundry men, worked out a new idea. Three pre-bundled spring assemblies were strapped onto an inexpensive pallet. When the springs reached the assembly line, the steel strapping was left on the individual spring bundles until they were mounted in place. This bundle method cut handling costs 50%!

we'll help you, too!

If you want to try palletizing for the first time, or improve your present methods, we'll help you, too. To have a Signode man call, write

TESTED AND APPROVED

SIGNODE

Steel Strapping Company

2663 N. Western Ave., Chicago 47, Ill.

this seal means security in shipping

Offices Coast to Coast.
In Canada: Canadian Steel Strapping Co., Ltd.
Foreign Subsidiaries and Distributors World Wide

LOT OF THE LEARNER

Begins on page 276

described in this news item from the *Connecticut Courant*:

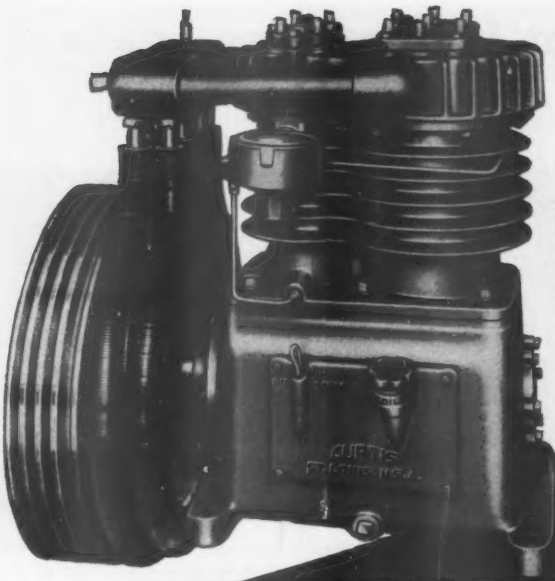
> Washington, Ky. July 23 (1814). A negro girl of 13 or 14 years of age, belonging to Mr. Reynolds, Sheriff of Bracken County, was last evening committed to the gaol of that county, for the murder of three of her Master's children. The eldest of these children, we are informed, was about 5 years old, and they were all strangled in the course of a few days. We learn that the culprit confesses the crimes, and further says she is only sorry that before detection she had not succeeded in murdering one more of her master's children and one other child in the neighborhood.

That girl was a slave, but the same pressures were at work with the indented youngsters. Resentment turns to hatred, and then the goal is not escape but revenge.

A 15-year-old girl servant put a large quantity of arsenic in the tea of her master, Philip S. Schuyler, Esq., of Watervliet, N. Y., and he almost died. When she was arrested and asked why she had done that, "she alleged as a reason for her attempting to destroy the life of Mr. S. that she thought by that means to be released from her bonds of indenture."

She was a fool as well as a criminal, but one senses how intolerable those "bonds of indenture" must have been to her, as they doubtless were to countless thousands of Americans in the long, unhappy period when indentured labor was so common in our country.

One is always tempted to think of the past as "the good old days." James Rush, printer's apprentice, and the quarter million or so other apprentices in the United States today, have no cause to think of the past as "the happy days." They are lucky to be living and learning their trades in the year 1952 and not 50 or 100 or 200 years ago.



It's new Curtis

MODEL 98 AIR COMPRESSOR
Two Stage Air Cooled 15 and 20 Horse Power

designed to give you **even greater dependability**
lower cost operation
longer life

Features that make the number 98 compressor truly outstanding:

1. Two-Cylinder Compressor — less friction and less oil consumption
2. Vibration Free — smooth operation
3. Self Oiling by positive Centro-ring method
4. Timken Main Bearings — provide easy external adjustment
5. Four section Finned Intercooler — effective cooling between stages
6. Valves readily removable as assembled units
7. Precison Built — assures long life and minimum maintenance
8. Experience backed by 98 years of "Know-How"
9. Also furnished in both base and tank mounted units

Mail coupon for additional information

Other CURTIS Equipment that Increases Plant Efficiency—Reduces Production Costs

Vertical Air Hoists for Low Cost Lifting or Lowering of Materials or Machines

Air Cylinders for Almost Any Pushing, Pulling or Hoisting Operation

CURTIS PNEUMATIC MACHINERY DIVISION CM719
of Curtis Manufacturing Company
1995 Kienlen Ave., St. Louis 20, Mo.

I am interested in items checked below:

☐ THE NEW MODEL 98 AIR COMPRESSOR ☐ VERTICAL HOISTS ☐ AIR CYLINDERS

Name.....

Firm.....

Street.....

City.....Zone.....State.....

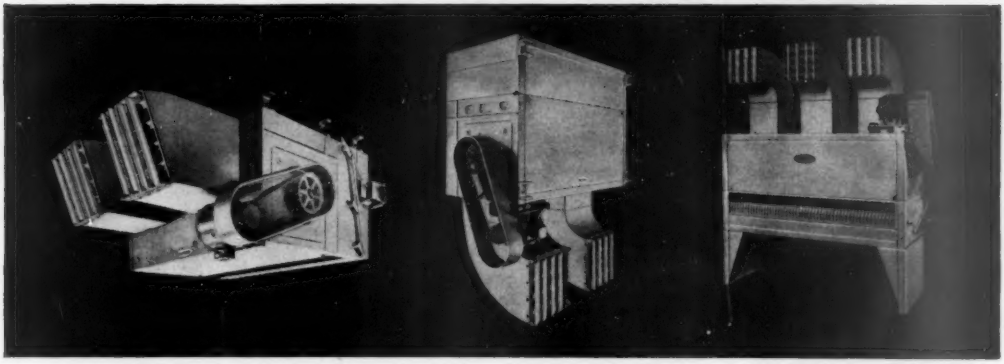
Other Curtis Compressors available in sizes from ¼ to 50 horsepower inclusive.

CURTIS PNEUMATIC MACHINERY DIVISION of Curtis Manufacturing Company

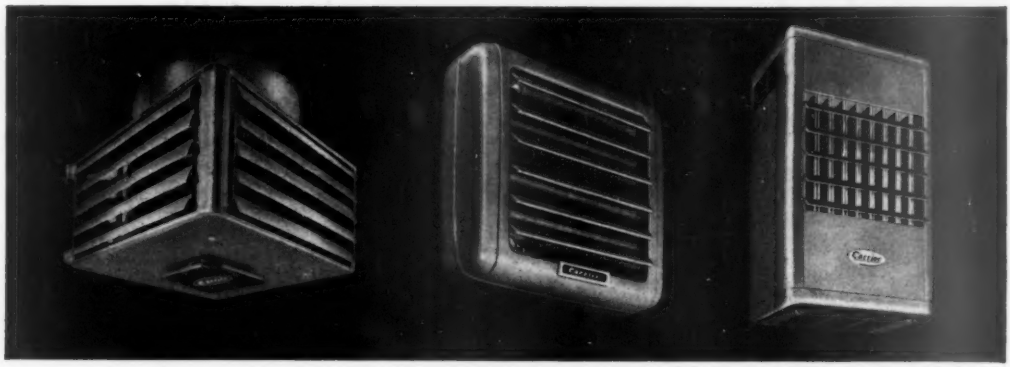
1995 Kienlen Avenue • St. Louis 20, Missouri -719

Low-cost heat for any size space

Carrier units heat big buildings or small, efficiently, economically



CARRIER BLOWER-TYPE HEAT DIFFUSERS 46P,Q,R heat *and* ventilate large enclosed areas in factories, warehouses, hangars, garages, etc. Floor, wall or ceiling mounted. Sectionalized for easy handling. Quickly altered to fit changing needs. Multiple discharge outlets with adjustable louvers deliver air in practically any direction. For use with steam or hot water. Available in 7 sizes, to 1,720,000 Btu's, they offer air-handling capacities from 4000 to 25,000 cfm. *Write Carrier Corporation, Syracuse 1, N. Y., for the catalog, "Carrier Heat Diffusers."*



CARRIER PROPELLER-FAN TYPE UNIT HEATERS. *Four-way Directed-flo vertical model 46S* gives quick heat from higher ceilings. Discharges in four directions, at any angle, in any quantity. Steam or hot water. 7 sizes: 82,000 to 500,000 Btu's. *Horizontal model 46U* directs warmed air from heights of 15 to 18 feet. Attractive, quiet, rugged. Single-row Aerofin heating coil with widely spaced fins offers less air resistance, makes cleaning easier. Steam or hot water. 10 sizes: 21,000 to 200,000 Btu's. *Gas-fired models 46T, shown, and 46TD (duct type)* give clean, economical heat wherever gas is available. Both feature one-piece heat exchanger and combustion chamber of Aluminized Steel. AGA-approved for all types of gas. 7 sizes: 70,000 to 230,000 Btu's.

Carrier

The Unit Heater Industry is proud of the recognition accorded it by the armed services and procurement departments of the United States Government. Proven in grueling use during World War II, unit heaters are now standard equipment in ships, plane hangars, living quarters, garrison buildings—wherever reliable, efficient heat is necessary for the completion of a task or the well-being of our fighting forces. On the home front, unit heaters serve equally important roles in industrial plants producing war material supplying the needs of the allied forces.

AIR CONDITIONING • REFRIGERATION • INDUSTRIAL HEATING

"LET UDYLITE SAY
WHATEVER THEY WANT
ABOUT OUR INSTALLATION
—IT HAS LIVED UP
TO ALL CLAIMS."

LEW WENGERT

Says Lew Wengert, Plant Superintendent of Utica Drop Forge & Tool Corporation

That was the reply we got when we asked Mr. Wengert, superintendent of the Yorkville plant of the Utica Drop Forge & Tool Corporation, about the Udylite Rotary Full Automatic in that plant. The machine is used for processing jet engine parts.

Mr. Wengert's enthusiasm is typical of Udylite customers. He has found, like many other users, that Udylite lives up to the claims made by our salesmen. The Udylite organization owes its progress and growth to the guiding principle of being honest with its customers. So, if you're in the market for equipment and supplies for a "better way in plating", it will pay you to look to Udylite. Call in your Udylite Technical Man today and let him tell you the complete story. Or write to The Udylite Corporation, Detroit 11, Michigan. *There's no obligation.*

THE *Udylite* CORPORATION
DETROIT 11, MICHIGAN

PIONEER OF A BETTER WAY IN PLATING

Get your copy of this NEW BULLETIN!

This important new Bulletin WH-851 explains in detail the causes and damaging effects of costly Water Hammer—and how it can easily be controlled with Williams-Hager Silent Check Valves. Learn how Water Hammer can be quickly and inexpensively controlled *in your piping system*—send for your copy of this new bulletin today.

THE WILLIAMS GAUGE CO.
1620-22-24 Pennsylvania Ave., Pittsburgh 33, Pa.

Use this coupon for Quick Action!

MAIL THIS COUPON TODAY

THE WILLIAMS GAUGE COMPANY
1620-22-24 Pennsylvania Ave., Pittsburgh 33, Pa.
Please send a copy of Bulletin WH-851 on "Water Hammer, Cause, Effect and Control in Piping Systems."

Name_____
Company_____
Address_____
City_____ Zone____ State____

F-1052

A questionnaire to find out

WHY VOTERS DON'T VOTE

HERE ARE THE EXACT QUESTIONS asked by Special Surveys to find out why workers at Interior Steel Equipment Company didn't vote in previous elections — and, presumably, the reasons many of them won't vote this year. *(For results of the survey at Interior, see this month's editorial on page 83.)*

I am working on a survey of voting behavior and would like to have your ideas. In past elections about half of the people who could have voted did not vote because of various reasons. We would like to learn what those reasons were.

1. • Two years ago when Lausche and Ebright were running for Governor of Ohio and Taft and Ferguson were running for United States Senator, did you vote in that particular election?
(If "no" on 1, ask):

2 • Can you remember what kept you from voting in that particular election? (What was it?) *If says "not registered", record that fact and ask:* How does it happen that you were not registered then?

3 • Did your wife vote in that particular election two years ago?
(If "no" on 3, ask):

4 • Can you remember what kept her from voting in that particular election? (What was it?) *If says "not registered", record that fact and ask:* How does it happen that she was not registered then?

5 • In 1948 when Truman and Dewey were running for President of the United States, did you vote in that particular election?
(If "no" on 5, ask):

6 • Can you remember what kept you from voting in that particular election? (What was it?) *If says "not registered", record that fact and ask:* How does it happen that you were not registered then?

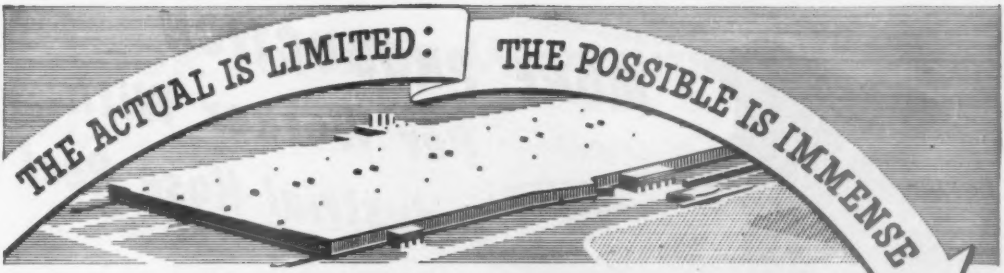
7 • Did your wife vote in that particular election four years ago?
(If "no" on 7, ask):

8 • Can you remember what kept her from voting in that particular election? (What was it?) *If says "not registered", record that fact and ask:* How does it happen that she was not registered then?
(If voted in both elections, ask):

9 • Since you reached voting age have you ever missed voting in a presidential election?
(If "yes" on 9, ask):

10 • Can you remember what kept you from voting in that particular election? (What was it?) *If says "not registered", record that fact and ask:* How does it happen that you were not registered then?

11 • What would you say are the main reasons that some people do not vote in national elections? (Do you think of any other reasons?)



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

WELDED DESIGN INCREASES RIGIDITY WITHOUT INCREASING COST

By **Eric Hartmann,** Experimental Research Engineer
The Porter Cable Machine Co., Syracuse, New York

BY changing over the design of our belt platen support to welded steel construction, we have cut deflection over 90%. The former cast construction, (Fig. 1) would deflect from .017" to .020" under 400 pound table pressure. The present welded steel design deflects only .0015" to .002"...10% of its original value.

Since steel is 2½ times more rigid than gray iron, it was possible to develop a more efficient product design on the platen itself without changing the basic dimensions of the machine or without increasing costs. On machine tools like ours, rigidity is basically important as it directly affects ultimate accuracy and efficient operation of the equipment.

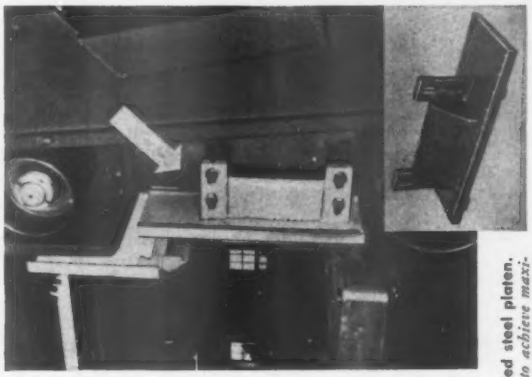


Fig. 3—Detail of Column *on Porter Cable BG-8 Grinder. Shows assembly of belt platen support governing the ultimate accuracy and efficiency of the machine.*

Inset: Rear view of welded steel platen. *Shows efficient use of steel to achieve maximum strength and rigidity per pound of metal.*

WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST

Fig. 1—Former Design—*Belt platen support for grinder was originally a casting. Required machining operations to finish the front face and the mounting arms.*

Fig. 2—Present Design in Welded Steel—*Is simpler to fabricate than the original construction. Components are pre-machined prior to welded assembly to simplify manufacture.*

HERE'S HOW

Machine Design Sheets **free on request. Designers and Engineers write on your letterhead to Dept. 277,**

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

MORE PRODUCTION Per Worker With Wayne Industrial Hose Reel

AIR SUPPLY AND TOOL SUSPENSION COMBINED IN EASILY-MOUNTED REEL

Wayne Industrial Hose Reels can boost job output, help reduce assembly costs and lessen worker fatigue in your plant. Air supply and tool suspension are combined to give greater working radius, and "spot" air supply for tools.

Air tool is within easy reach at all times. No cables or dangerous loops of hose to cause accidents. Hose is completely protected on Reel when not in use.

Spring tension of Reel counterbalances air tool. Ratchet holds hose at any desired length until released by a short forward pull. Then hose automatically rewinds on the Reel. Automatic braking prevents whipping or lashing action. Reel can be mounted in many convenient positions.

Find out how Wayne Industrial Hose Reels will fit into your production picture profitably.

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND

Wayne

NATION WIDE SERVICE

INDUSTRIAL HOSE REELS

FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS

Look for this Warranty

when you buy

ASPHALT-ALUMINUM ROOF PAINT OR COATING

It's your assurance of
LOW-COST, LONG-LIFE ROOF PROTECTION!

The Warranty above assures the right amount of aluminum pigment in an approved vehicle for Asphalt-Aluminum Roof Paint and Coating. This Warranty is your positive assurance of economical, lasting, one-coat protection for your industrial buildings with rustable metal or built-up roofs.

When asphalt and aluminum are properly combined, as specified in the above Warranty, aluminum flakes rise to the surface and "leaf" on the drying asphalt to form a firm metallic shield. This shield reflects the actinic rays of the sun and thus protects the asphalt base against drying out . . . adds years and years to roof life. And because aluminum coated roofs reflect up to 85% of radiant heat rays, buildings are cooler in summer, too. Employee efficiency and morale are increased.

Remember—only the finest Asphalt-Aluminum Roof Paints and Coatings, made by leading manufacturers, carry the Warranty Seal. Look for it when you buy. Or write for names of Asphalt-Aluminum Roof Paint and Coating manufacturers who comply with the Warranty requirements. **Reynolds Metals Company, 2518 South Third Street, Louisville 1, Kentucky.**

This advertisement appears in the interest of the Roof Paint and Coating Industry of the United States

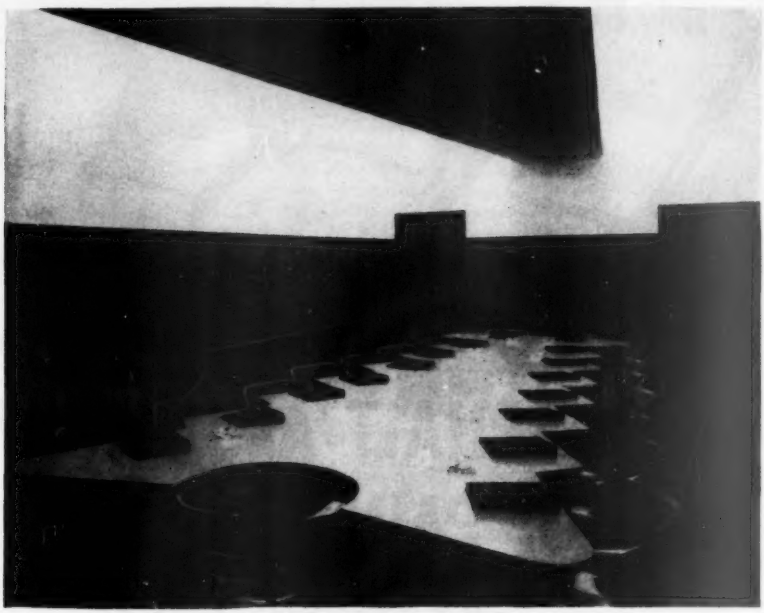
YOU MUSTN'T MISS—

INDUSTRIAL NEWS, BEGINNING ON THIS PAGE

TIMELY HINTS TO BETTER MANAGEMENT ON PAGE 312

QUOTES FROM INDUSTRY'S LEADERS ON PAGE 320

IDEAS TO STIMULATE YOUR THINKING, ON EVERY PAGE



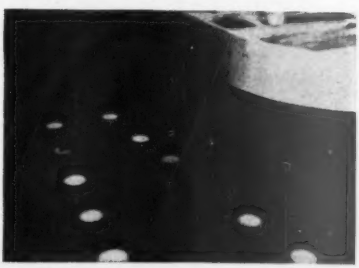
SAWTOOTH DESIGN and taper assure clear view of conference leader and visual aids.

Work "Simp" Training Made Easy

You can make your work simplification classroom on object lesson in work simplification practice.

That's what Radio Corp. of America, Harrison, N. J., has done with a new room that's built to make learning pleasant and effective. Previously work simp classes "met in every imaginable place — cafeterias, ladies' locker rooms, offices, in nooks and in crannies," according to Walter Hoffman, RCA work simplification administrator at the plant. Here's how they did it:

Turn the page



SPECIAL LIGHTING set-up spotlights workspaces when room is dark for projection.

Heave-Ho by Push-button with a ZIP

handle it "thru-the-air"—faster for less

Do you still have places in your plant where skilled hands wrestle with heavy loads? That's tough on workers! Expensive, too! Consider the savings a Zip-Lift will bring you. One man can press buttons to handle loads up to 2,000 lbs. — faster, without effort — and at far less cost.

There are reasons aplenty why the Zip-Lift is America's fastest selling wire rope electric hoist. It has all the quality features that make it more usable, more dependable — and absolutely safe. Hang it up on a hook, jib, or trolley — beside machine tools, along assembly lines, around loading docks, receiving rooms, warehouses. The Zip will pay for itself over and over — and over again!

CALL YOUR ZIP-LIFT DEALER

or write for Bulletin

HARNISCHFEGER CORPORATION

4400 WEST NATIONAL AVENUE • MILWAUKEE 46, WISCONSIN

YOU MUSTN'T MISS— *Begins on page 300*

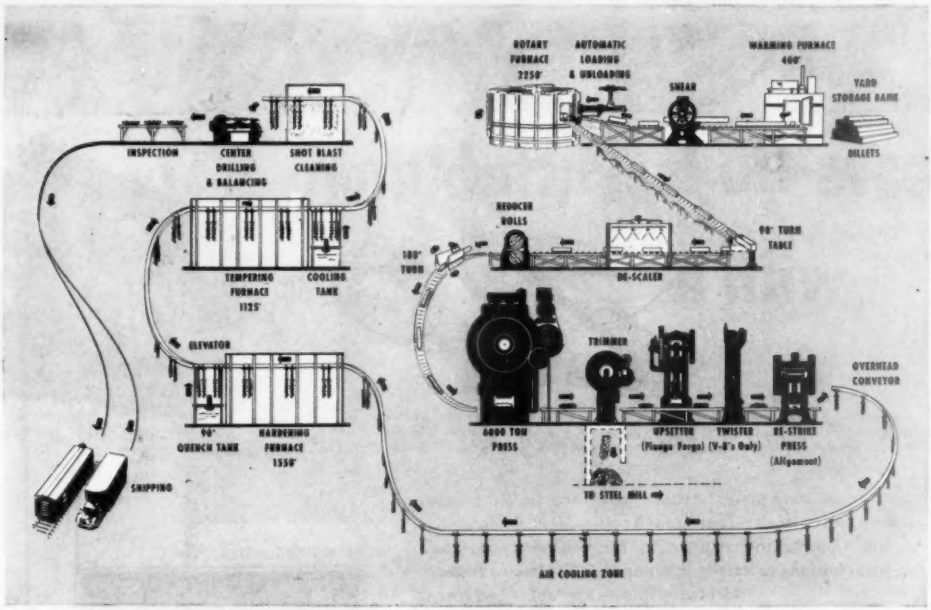
The Conference Table · It's the outstanding feature of the room. Slight taper plus notched edges of the top give each student a slot from which he can see the conference leader, blackboard, or movie screen without craning. And the conference leader can see all his students, too.

The 18-ft. table is 8 feet wide at its point of widest taper, and provides workspace for 16 students and a conference leader. Legroom underneath is ample.

The table top is made of cigarette-proof, non-reflecting material. It's edged with a corrugated anodized aluminum strip that's tough and durable. At each seat location there's a writing board that pulls out of the table top. And there's a drop leaf at the conference leader's spot so that an opaque projector can be spotted in. Korda Industries makes the table.

Lighting · A wide island projecting from the ceiling duct supports and hides the indirect lighting installation. There are also spotlight arrangements for lighting workspaces when the room is darkened for projection. Each of a series of baffle-covered spotlights directs two beams of light at the table top.

The Room · It's 35 by 15 feet. Walls are covered with leatherette up to a height of 6 feet. The ceiling and portion of three walls are sound-conditioned, floors are asphalt tile.



BILLETS TO CRANKSHAFTS AUTOMATICALLY (almost). Schematic drawing—starting upper right—shows how Chrysler is . . .

Making Press Forging an Automatic Process

The pushbutton factory moves a long step nearer reality in a traditional man-with-machine industry with the opening of a new department at the Dodge Forge plant, Detroit.

Men still work with the machines at Dodge Forge. But the result of intensive mechanization and conveyorizing of the crankshaft forging operation has enabled the company to:

• **Triple output.** Eight men used to produce 50 crankshafts per hour with the old hammer forging process. With the substitution of the near-automatic press forging process, 12 men produce 150 of the same kind of crankshafts per hour—100% increase. On V-8 crankshafts the production increase is even greater.

• **Obtain product standardization impossible under the old method.** Each unit going down the line gets the identical treat-

TroubleSAVING!

with 854 sizes of . . . ready made bearings for machine tools and industrial machinery.

with 324 sizes of . . . completely finished bearings for electric motors of all sizes and makes.

with 263 sizes of . . . tubular and solid Bronze Bars completely machined on all surfaces.

Bunting Ads win 1st award in contest sponsored by Industrial Distributors Associations.

Bunting Standard Stock Bearings, Electric Motor Bearings and Precision Bronze Bars offer the quickest, simplest and most economical solution to your bearing problems in production and maintenance.

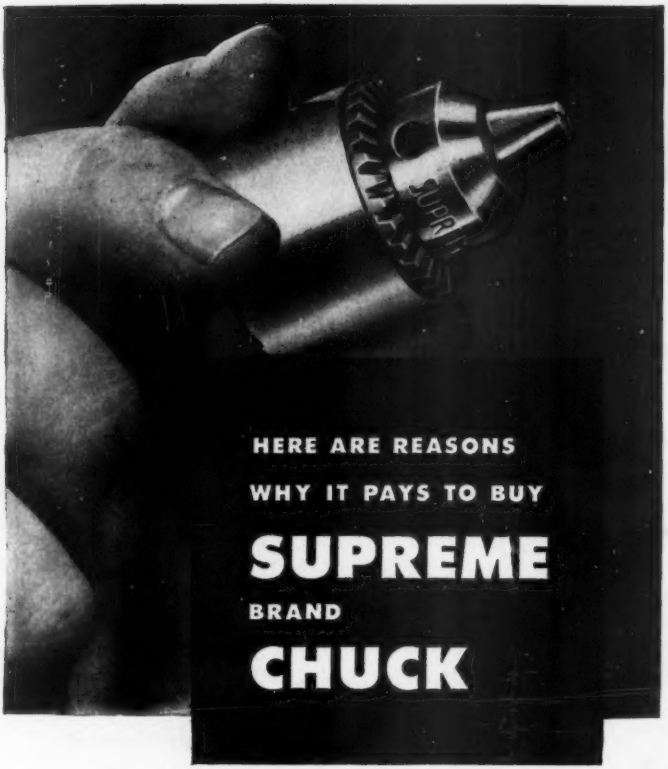
Bunting®

BRONZE BEARINGS • PRECISION BRONZE BARS • BUSHINGS

. . . IN STOCK EVERYWHERE

Bunting products are instantly available in all markets, from the stocks of leading industrial distributors and distributors of specialized industrial items. Ask your distributor or write for catalog.

THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES



SUPREME brand chucks are quality made to withstand hard usage and to give accurate performance on the job. Every attention is given to proper materials and every care is taken to be sure that SUPREME brand chucks uphold their name—Supreme. Listed are a few points that bring them trade acceptance. The best test . . . is to try them.

- Entire chuck body is hardened inside and out.
- Outer shell is smooth . . . an added safety feature.
- Supreme brand chucks and keys are interchangeable with other makes.
- Key driven gear and threaded nut are one piece.
- Jaws are nickel chrome moly alloy steel, expertly heat treated and precision ground.
- Each chuck individually tested for accuracy.
- Sold through distributors.

SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

YOU MUSTN'T MISS—

Begins on page 300

ment, since the human skill element is minimized.

• **Cut maintenance costs.** Maintenance on the presses is less costly than maintenance of the hammers.

• **Reduce the human skill and effort required to do the job.** Wage rates are approximately equal under both old and new processes, however.

• **Save on material costs.** Special pre-formed billets used in hammer forging cost more than the ordinary billets used with this forging press. Billet cutting and shaping is done automatically in the Dodge plant.

How the process works • Nerve center of the department is a carefully synchronized mechanical materials handling system. Time controls, photo-electric cells, and various switches trip a network of electrical, mechanical, or hydraulic devices that guide the movement of materials.

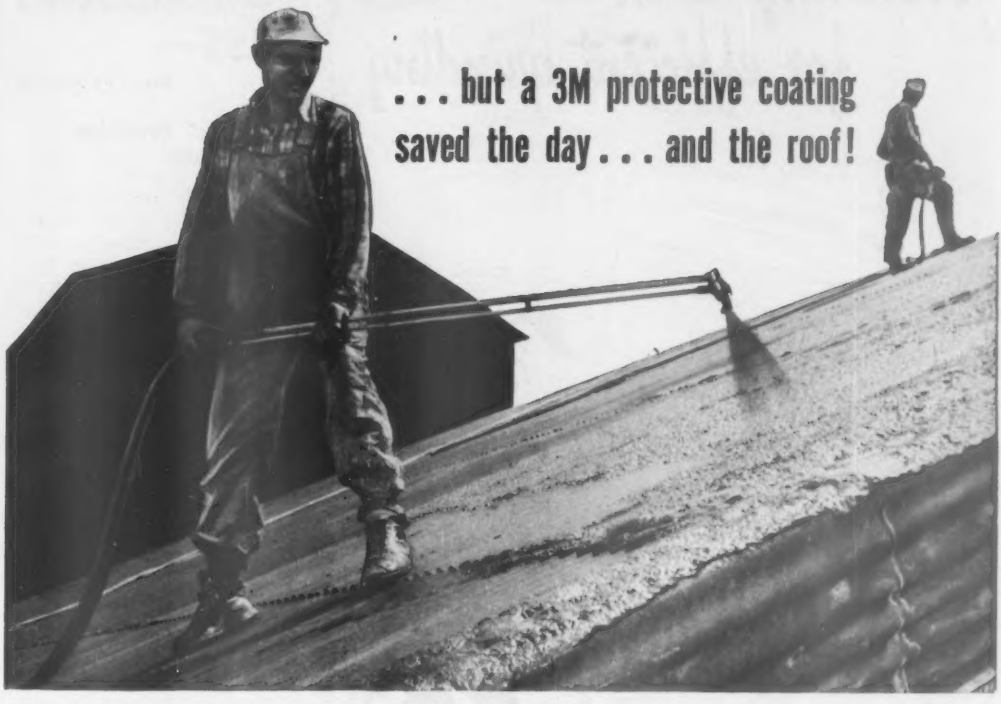
Steel billets move continuously by conveyor from storage to a shear, which automatically cuts them into proper size for forging. Another conveyor takes the cut billets to a rotary furnace, where a jaw-type mechanism feeds them gently, one at a time, onto the furnace floor.

From furnace to press • When the billets have gone nearly full circle on the rotating furnace floor, they're at proper forging temperature. Another jaw-type mechanism unloads them. Then, after their automatic trip through a jet water de-scaler and a reducing mill, they're ready for the first strike of a 6000-ton press.

Forging, heat treating, and finishing operations that follow are a combination of manual and automatic. Overhead trolleys and air cylinders simplify the work of operators and minimize their labor.

Turn the page

CORROSION . . . almost "brought the house down"



When pieces of a corrosion-weakened roof began endangering workers in a plant in Copley, Ohio, the plant manager decided he'd better do something about corrosion . . . and *quickly!*

He consulted with 3M and was advised to use EC-244, a tough, rubbery coating with remarkable corrosion-resistant properties. He found that he could patch bad spots on his roof—by adhering a piece of felt to the surface and then coating EC-244 over it—or he could spray the material over the entire surface of the roof. And he found that he could do it quickly because with EC-244, the surfaces to be coated needed no surface preparation.

Here's more proof of its effectiveness! *In accelerated tests conducted by the laboratory of a major pipe line company, EC-244 has withstood more than 1272 days' burial. Conventional covering materials have failed in less than 900 days.*

3M COATING EC-244

ONE OF OVER 1000 ADHESIVES, COATINGS AND SEALERS

USES: Underground Pipe Lines
Outdoor Pipe Lines
Underground Tanks and Equipment
Abrasion-Resistance (coal hoppers, railroad and others)

PROPERTIES: Low moisture vapor transmission, low temperature flexibility, excellent sound deadening characteristics; sandblast resistance superior to many other materials; excellent resistance to weathering; corrosion, erosion and abrasion-resistant characteristics.

FOR MORE INFORMATION ON EC-244 OR SIMILAR MATERIALS, WRITE 3M, DEPT. 310, 411 PIQUETTE AVENUE, DETROIT 2, MICHIGAN

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YOU MUSTN'T MISS—

Begins on page 300

Engineers' Program Gets Results

A three-point program launched last year to relieve the shortage of engineers is starting to pay off.

That's the word from Engineering Manpower Commission of Engineers Joint Council. Here is the progress reported:

1. Industry's making better use of engineering talent. Many companies have streamlined engineering departments so that engineers are used only where needed. Routine tasks are being handled by engineering aides or secretaries. EMC calls this an important factor in reducing in one year the number of engineers needed from 80,000 to 50,000.

Upgrading of young engineers is becoming a policy in many companies. This releases the highly experienced men for jobs only they can handle.

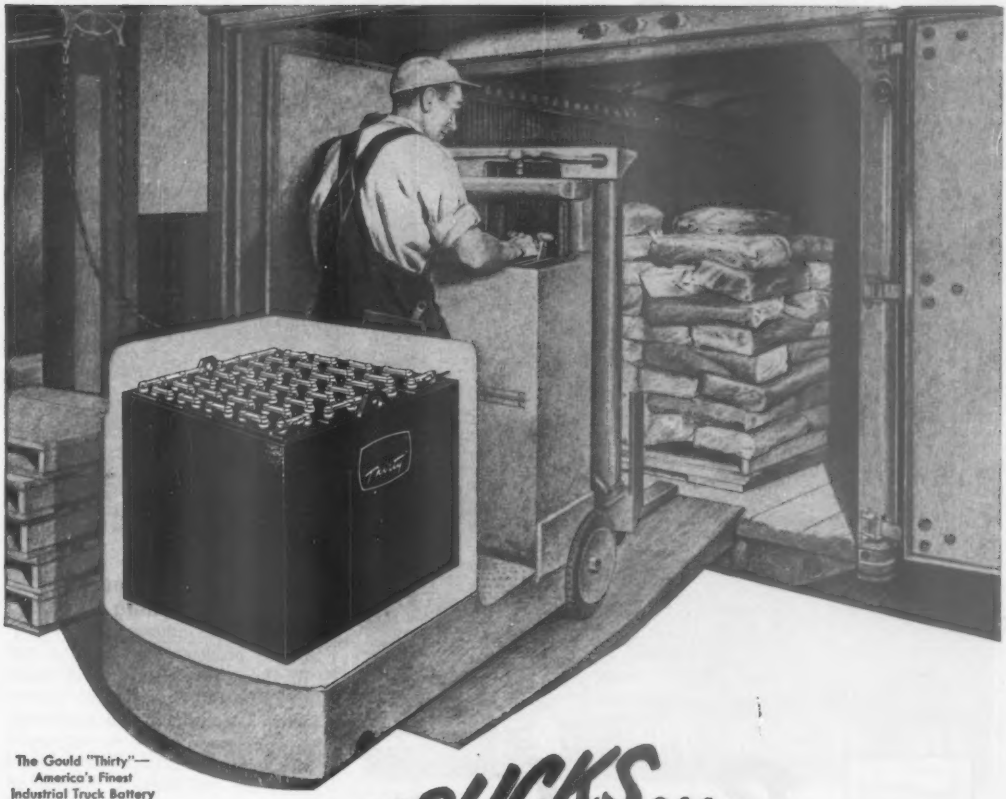
On-the-job training for engineers is being enlarged upon by industry. This gives young engineers a chance to specialize when they're interested and qualified.

2. Local industry is working hard to interest more qualified youngsters in an engineering career. Looks like it's succeeding, too. The number of male students entering engineering colleges last year was 15% higher than the year before—even though general male enrollment in college had dropped 12%.

Plants are sponsoring more open houses and more scholarships for engineers. School guidance people work closely with engineering societies. Posters and other promotional material reach all high schools and junior high schools.

3. There's been some—but not much—progress in convincing draft boards and the military that young engineers should be kept out of service.

Turn the page



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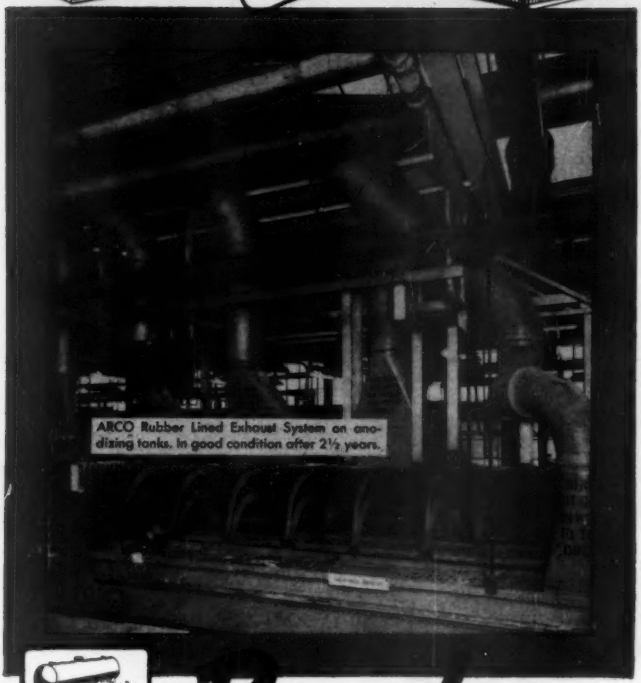

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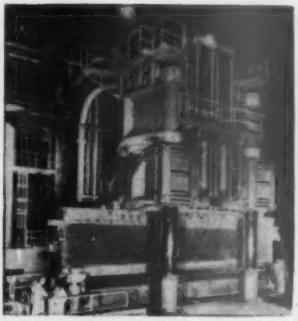
Begins on page 300



KING-SIZE hydraulic press forges bigger boiler plates as . . .

U. S. Industry Speeds Big Press Building

American industry is stepping up its program to build the big forging presses needed to mass produce large structural members. Three mammoth hydraulic presses made news recently—all designed to substitute large forgings for the tedious joining of many smaller parts.

For aircraft • The Air Force is building two aluminum forging presses—rated at 35,000 tons and 25,000 tons hydraulic pressure. Kaiser Aluminum & Chemical Corp., Newark, Ohio, will get them. They'll be the nation's largest. Biggest one at present is rated at 18,000 tons.

The two presses, one of them 9 stories high, will be part of the Air Force's $389-million program to mass-produce large aircraft parts. They'll form in one piece major structural members of airframes. This will save time, manpower, and material over the conventional method of machining smaller parts and joining them. For instance, a conventionally-fabricated stabilizer consists of 547 pieces, exclusive of attached hardware. With the new presses, you need only five large parts.

Special oversize aircraft-alloy

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Make Your Own Point-for-Point Test And Discover Servel's Amazing Extras!

No other installation offers all these amazing features	SERVEL	OTHER
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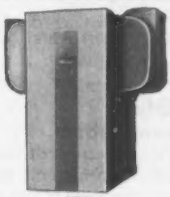

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Model PD-103L 3/16" Pneumatic Drill — Weight 14 Oz.

Model PD-204L ¼" Pneumatic Drill — Weight 1⅝ Lbs.

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Begins on page 300

ingots will feed the press. The 32×85-in. cylindrical billets weigh about 7000 lb., and are more than three times larger than those generally used for forging and extrusion in the aluminum industry. Kaiser Aluminum's division of metallurgical research developed the ingots.

For boiler drum plate • Babcock & Wilcox Co. recently installed the nation's largest press for forming boiler drum plate at its Barberton, Ohio, plant. The 6500-ton vertical hydraulic press is part of B&W's $30-million expansion program since World War II.

The company built the press almost entirely in its own shops. It will make possible the bending of longer boiler plates. As a steel drum is composed of cylinders made from plate, a longer plate means that there will be fewer circumferential welds. Again the result is less joining, less time, and less money.

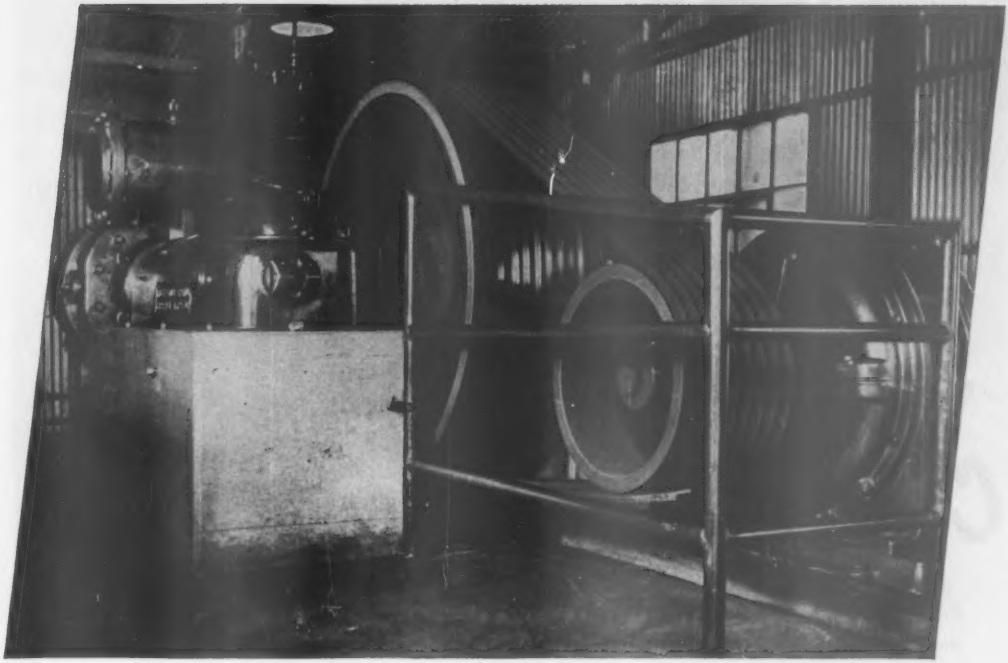
Push buttons control all movements of the press. A light touch of the finger on a button can jockey a heavy steel part on the press within the precision of 1/16-in. to 1/32-in. A remote selsyn control guides the rise and fall of the massive press platen.

Longer Life for Vacuum Tubes

Good news for users of industrial electronic equipment: Radio Corp. of America says it has built 10,000 hours of service into its industrial electronic tubes and backs it up with a length-of-life guarantee.

According to H. J. Prager, design engineer for RCA Victor's tube department, the company will replace any tube that fails either before it has given 10,000 hours of service or within two years of initial use. (One year of continuous use in 8660 hours.)

Turn the page



Keep your production in the groove with Thermoid V-Belts

Production men, in all kinds of industries, rely on the greater strength and longer life in Thermoid V-Belts to provide smooth, efficient performance and long wear . . . keep production in the groove.

From huge multiple V-Belts of rayon grommet construction to the smallest fractional horsepower belts, you can always depend on Thermoid quality.

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All these advantages add up to lower operating and maintenance costs, and in the long run, the most economical V-Belts you can specify for the job.

Call your nearest Thermoid distributor today. He has a complete range of sizes to meet your requirements. And for your special V-Belt problems, experienced Thermoid Sales Engineers are always ready to help you.

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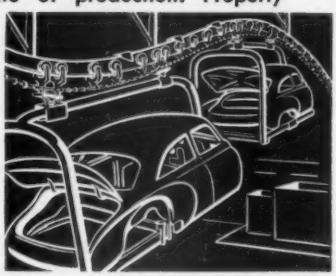
why buy
CONVEYORS?

Price of mass produced articles depends on the cost of men, machines, materials and ORGANIZATION.

You can't do much about the first three, but the possibilities for cost reduction in ORGANIZATION are a real challenge to management.

Conveyors do help to organize—tie the several processes together and regulate rate of production. Properly applied conveyors can blend processing and handling operations at larger savings in man and machine hours.



MHS Engineers *have a brilliant record in solving problems like this.*

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YOU MUSTN'T MISS—

Begins on page 300

TIMELY HINTS

PROFESSOR OF SPRAY PAINTING explains a fine point at Binks' . . .

Spray Paint Course Open to Industry

Need a spray painting expert in your plant? Then consider sending one of your men to the tuition-free spray painting school scheduled to be held Nov. 10-14 at Binks Mfg. Co., Chicago.

Instruction covers operation, maintenance, and repair of both manual and automatic spray guns. Students also learn about spray booths, oil and water extractors, air compressors, and portable painting units. Classes are limited in size so that each student gets plenty of personal attention from the instructor.

There's no charge for the course. All you have to do is pay the fare to and from Chicago and expenses while there.

If you're interested, write Mr. E. F. Watts, Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill. Better do it right away, too. Applications should be made two weeks in advance of the course.

Turn the page

FACTORY MACHINERY ANCHORED with DRIVE-IT

Machinery vibrating loose from anchorages can cause many maintenance problems. Drive-It fastening system solves this. Washington Canners Co-op. at Vancouver, Washington, uses Drive-It "400" for heavy duty fastening when anchoring machinery.

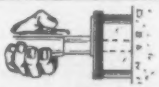
split-second fastening to concrete steel

Drive-It uses a small powder load to drive hardened steel pins into concrete or steel. No power lines! No drilling!

UL

DRIVE-IT is the only powder-actuated tool approved by Underwriters' Laboratory.

DRIVE-IT cannot be discharged accidentally due to the push and turn sequence. This, plus the large safety pad makes *DRIVE-IT* triple safe.



Exclusive Automatic Barrel Extension for fastenings inside junction boxes or other recesses.

DRIVE-IT is the only powder-actuated tool which requires but one standard power load regardless of penetration desired.

Exclusive Swivel Safety Pad easily rotated for getting into close quarter work.

DRIVE-IT "300", lowest cost fastening tool. Low original cost and low operating cost.

a drive-pin for every job

OVER 50 TYPES AND SIZES

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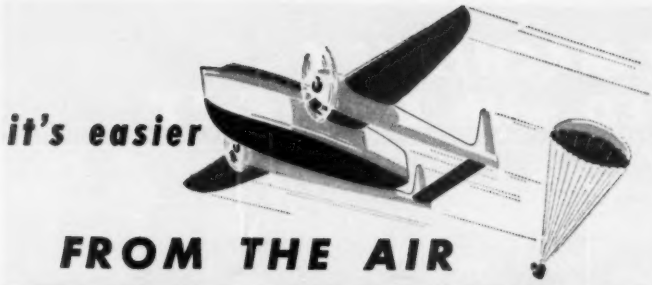
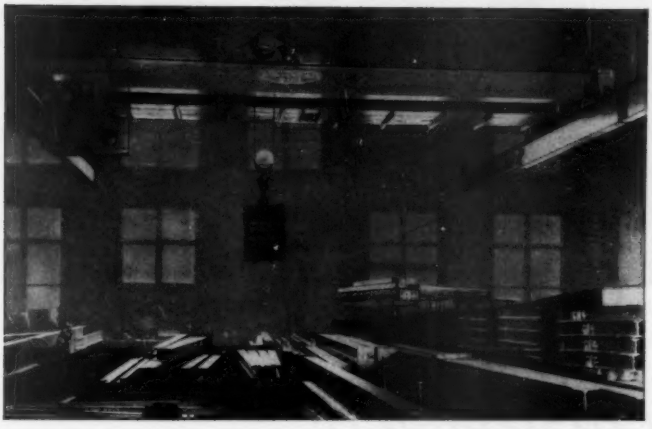


it's easier

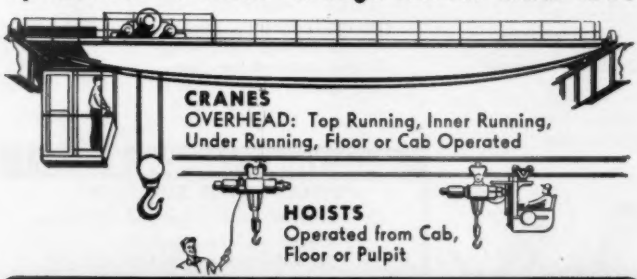
FROM THE AIR



● Want to spot loads more accurately — stack them higher? Then put this Shepard Niles Crane to work! From his vantage point, the operator can see where loads should go, then deliver them there directly.

● Little wonder so many plants use through-the-air handling — it's so fast, so easy, so economical. But which crane is best for your plant? The Shepard Niles representative is qualified to answer this question because he specializes in through-the-air handling. He knows the importance of installing the right equipment from the start. Write for Bulletin 180 today — and ask to have a representative stop by your office.

Specialists in loads through-the-air since 1903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YOU MUSTN'T MISS—

Begins on page 300

How to Get More From Your Workers

How can you get more production from your employees? Tell them what they want to know about their job, says Lawrence A. Appley, president of American Management Assn. Let them know, he says:

. . . what they're supposed to do.

. . . what authority they have.

. . . what their relationships are with other people.

. . . what constitutes a job well done in terms of specific results.

. . . what they are doing exceptionally well.

. . . where they are falling short.

. . . what they can do to improve unsatisfactory results.

. . . that there are just rewards for jobs well done.

. . . that what they are doing and thinking is of value.

. . . that the boss has a deep interest in and concern for them.

. . . that the boss is anxious for them to succeed and progress.

The checklist appeared in *Management News*, a publication of American Management Assn.

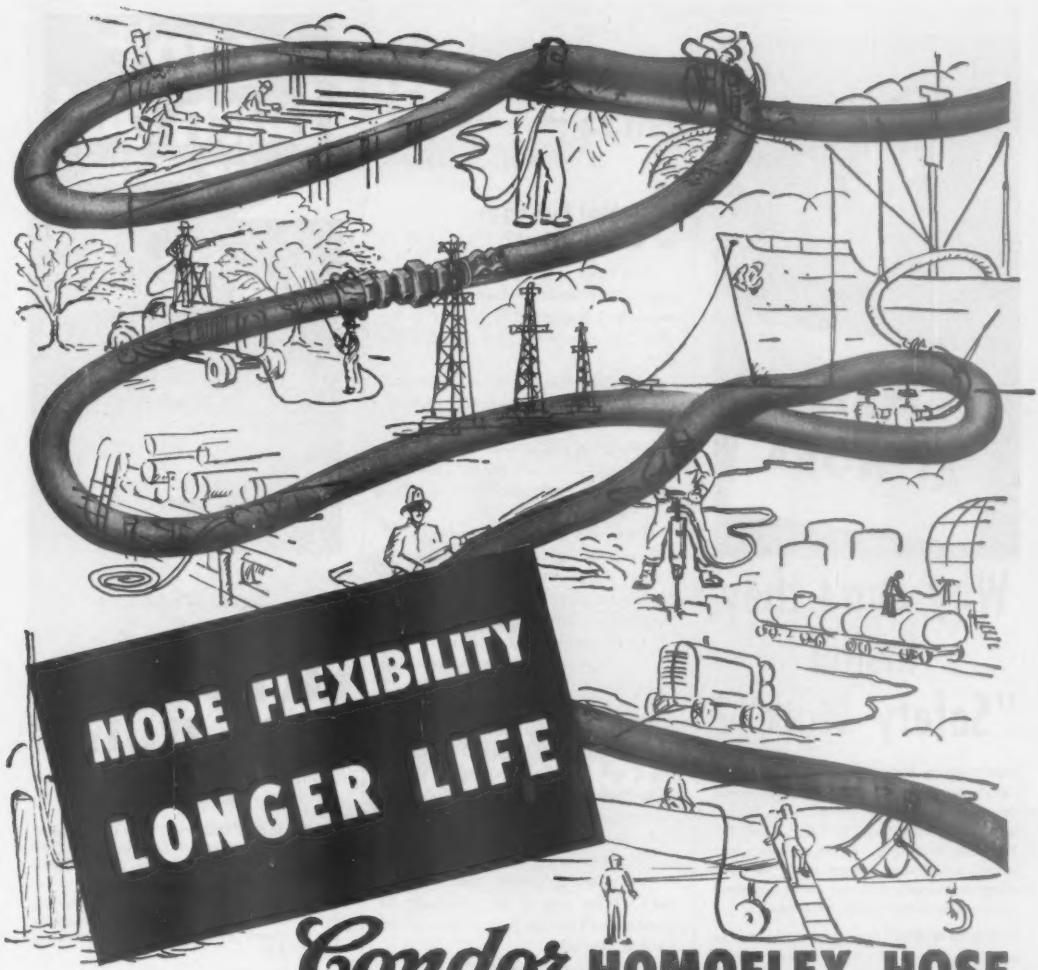
Safest Speed For Walk-On Conveyors

If you want your people to walk on and off conveyors with safety, run them at a speed of a mile and a half per hour (132 feet per minute.)

After a year of research, Goodyear Tire & Rubber Co., Akron, says that speed is safest for getting on and off. Even children, persons with leg handicaps, and women with high heels found the speed plenty safe.

The research was part of a Goodyear - Stephens - Adamson Mfg. Co. project to develop a passenger conveyor for New York subways.

Turn the page

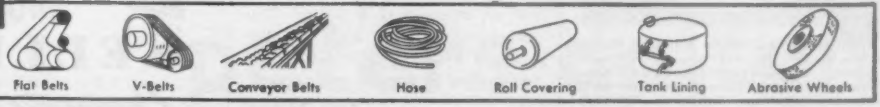


Condor HOMOFLEX HOSE

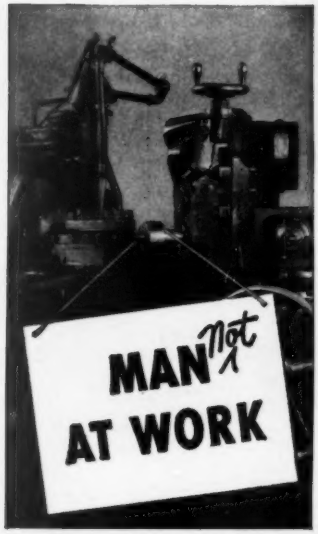
R/M engineers found a way to practically "homogenize" the wall of Homoflex Hose . . . By ingenious design, rubber tube and cover are blended together inseparably. The result, a hose wall with no pre-set twist, or stiffness. That's why Homoflex Hose is flexible as a rope, light and easy to coil and uncoil. Naturally, it lasts longer too. Made for air, water and other standard uses, Homoflex Hose has additional advantages described in Bulletin 6879D. Write for a copy • As the background suggests, Raybestos-Manhattan makes hose for every use. Your R/M Distributor will show you samples and discuss construction advantages.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks
Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls



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LOST MAN-HOURS are costly — often they're caused by slips and falls *inside* your plant. Help prevent on-the-job injuries by installing "SAFETY-WALK" Non-Slip Surfacing. A few dollars spent in protecting the "danger spots" of your plant or building will pay off in increased production, better public relations.

"SAFETY-WALK" is easy to apply. Sticks at a touch — no adhesive required. Use it on stairways, ramps, walkways. Unaffected by water or grease, it is ideal wherever the hazard of a fall is present.

Write today for complete information and free sample of "SAFETY-WALK." Address Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Dept. FM102

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YOU MUSTN'T MISS—

Begins on page 300

Why Not Put Eggs in One Basket?

You hear lots about the advantages of industrial dispersal these days, but there's still plenty to be said for concentration of production.

A good example is General Electric Co.'s 1000-acre, 16,000-worker Appliance Park, now a-building at Louisville, Ky. The plant will produce many types of appliances—refrigerators to electric ranges.

Here are eight advantages of concentrating production of so many different products in one plant, according to W. L. Goodfleisch, assistant superintendent of production and planning for G-E's appliance and merchandise department.

1. Concentration of talent. The Appliance Park arrangement puts all the best brains where they're most needed.

2. Easier standardization of products.

3. More intense competition for better ways to produce.

4. Reduced prices and inventory. This comes as a result of concentration in procurement of raw materials.

5. Easier shipment. Concentration of products permits direct distribution of mixed carload shipments.

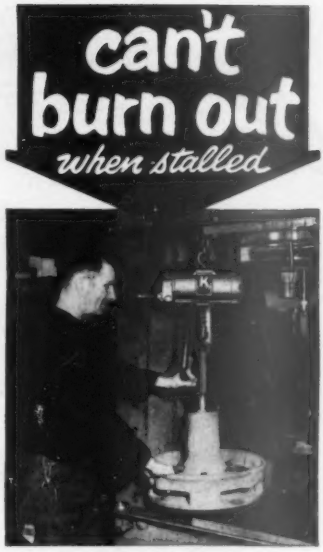
6. Stabilization of labor force. Instead of laying off during slack seasons, G-E can shift labor loads from one product to another, as demand changes.

7. Simplified worker training. Many operations are similar from one product to another.

8. Concentration of administrative forces.

Concentration in production is not an over-all G-E policy. The company practices dispersal, too —when dispersal offers a better answer to a particular problem.

Turn the page



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KELLER Air Hoist

with positive displacement piston-type air motors

VARIABLE SPEED from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

LIGHTWEIGHT—A 1,000-lb capacity hoist weighs only 30 lb—easy to carry up or down a ladder, and move from job to job.

DUST, FUMES cannot injure an air motor. Nor will it burn out, even if stalled all day long.

LOW MAINTENANCE because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

CONTINUOUS DUTY—Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

K KELLER TOOLS

SEND FOR DETAILED INFORMATION

KELLER *Pneumatic Tools*

KELLER TOOL CO., GRAND HAVEN, MICH.

Too often, attempts are made to solve difficult dust-collecting problems with so-called standard equipment. The picture above shows erection of a large CUSTOM-MADE DUST COLLECTOR on the roof of a leading auto plant.

If your problem involves wet collection and requires unusual hooding or conveying, we invite you to avail yourself of our store of knowledge and experience.

Write, wire or phone

**17936 RYAN ROAD
DETROIT 12,
MICHIGAN**

peters-dalton
INCORPORATED

NOW... A NEW VENTED

Full-Circle Venting!

60 to 500 WATTS

Listed by Underwriters' Laboratories, Inc., for Class I, Group C and D, Hazardous Locations.

1. Standardized Canopy
2. Connecting Block with Spring-leaf Contacts
3. Release lug for easy fixture removal
4. Shock-Absorbing Socket
5. Porous Metal Interiors
6. Notches provide screw driver leverage in releasing globe ring
7. Heat and impact-resisting Glass Globe
8. Detachable Reflector

Pat. Applied For

The ALL-NEW

APPLETON AA-51 SERIES

Here's the safest explosion-proof fixture ever designed for hazardous location lighting! AA-51 Full-Circle Venting—use of the entire lower edge of the hood as a continuous louvre—is combined with porous metal interiors to provide much more even heat distribution, *definitely cooler operation.*

Wire-free construction in AA-51 Canopies permits instant removal of entire fixture. Relamping or cleaning becomes safe, swift, simple! Canopies are standardized—will take any fixture in the AA-51 line, 60 to 500 watts, without rewiring.

- Greater Safety
- Easier To Maintain; Faster To Service
- Maximum Lighting Efficiency
- Cooler Operating

APPLETON Explosion-Proof Equipment

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1715 Wellington Avenue • Chicago 13, Illinois

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

Sales Engineers in All Principal Markets

YOU MUSTN'T MISS—

Begins on page 300

New Way to Speed Drying

You can cut down drying time of coatings, finishes, and inks to a few seconds with a new drying process, says Armour Research Foundation, Chicago.

The Foundation developed its "Chem-Dry" process for Meyercord Co., Chicago, to speed drying of inks which formerly took from a day to a week to harden. Other applications are expected to be found in the manufacture of oil cloth and linoleum, and in the finishing of furniture, appliances, metals, and other products.

How it works. A sulfur-dichloride vapor reacts with pigment oils as coated materials are conveyed through a drying chamber. Drying is very fast, but depends to some extent on the coating and the material coated. It's inexpensive, too: Sulfur-dichloride costs about 11 cents a pound.

Availability. Meyercord has patents on the process. It's now planning to license other companies that want to use it.

You Might Try This Next Summer

Here's a good way to combine community relations with a program of replacing vacationing workers next summer: Hire local high school teachers in the status of new employees.

Elgin National Watch Co. hired teachers with success at its Elgin, Ill., and Lincoln, Neb., plants. Teachers had a chance to see for themselves how industry works, particularly from the local viewpoint.

Elgin said it believed the teachers, backed by practical experience, would be better equipped to handle vocational counseling in the school. Teachers said they hoped the program would be continued.

Turn the page

How much production in a full plate?

POT ROAST gets plenty of calls at Mack International Motor Truck Corp., Allentown, Pa., where Crotty Food Service has been keeping everybody happy for more than 10 years. Another example of how Crotty plans menus for local tastes and budgets.

More than you think! Let your employees have *all* the food they can afford *when* they need it. Then, low morale and inefficiency . . . two of the hidden costs of poor food service . . . can't cause slow-downs.

When Crotty moves in, hidden costs move out. Experts, backed by 21 years' leadership in employee feeding, take over full responsibility consistent with your company policy. You get the system that's best for you. Or your present installation wins new satisfaction. All *at lowest possible cost* to you and your employees.

WRITE FOR BOOKLET, "Employee Feeding Methods" and Operating Checklist. CROTTY BROTHERS, INC., 137 Newbury St., Boston 16, Mass. Operating in 16 States and 45 Cities.

CROTTY
BROTHERS, INC.

SINCE 1930...THE FOOD SERVICE MANAGEMENT THAT

keeps everybody happy

Music may be the answer to your cost reduction problem

SOUNDS FARFETCHED . . . but the figures will surprise you. Checks on plants using work-music supplied by RCA Sound showed these amazing results:

1. **One plant operator estimated every dollar invested in work-music has saved him $84.00. More than 8,000 man-hours saved in 7 months.**
2. **An electrical manufacturer considered work-music responsible for a cut in rejects from 3% to 0.5%.**
3. **In an experiment in a plant using RCA Sound, music was shut off for a month . . . productive efficiency dropped 18%.**

Look into RCA Sound for improved production administration

In thousands of plants RCA Sound is at work every day as a paging system, public address system, and as a source of improved employee attitudes. True, enjoyable reproduction makes it a favorite with employees. RCA engineering and service have made it the choice of management over all other makes. RCA's broad technical and practical background offers all the benefits of comfort-engineered sound—eliminates the discomforts of poor sound performance.

How does PLANT LAYOUT affect a SOUND SYSTEM?

When you select RCA Sound, you get the economy of a custom-made system built from standard components. RCA sound systems have the flexibility you need to meet any plant layout requirement—to do any sound reproduction job you want.

Contact your RCA Sound distributor for details on RCA Sound and the nation-wide facilities of the RCA Service Company. Or mail the coupon today. **MAIL COUPON NOW**

Sound Products, Dept. 48J
Radio Corporation of America, Camden, N. J.

Please send me your free booklet on RCA Sound, *A New Industrial Giant.*

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

RCA **RADIO CORPORATION of AMERICA**

YOU MUSTN'T MISS—

Begins on page 300

QUOTES

"Management must recognize . . .

". . . its responsibility to humanize industry, to give corporate operations meaning for the individual. At the same time every employee must understand the economic conditions on which alone the corporation can survive. . . . Is it impossible to produce with maximum individual freedom the material goods to support our way of life, and also pursue charity and justice? I assert . . . that it can be done."—*John S. Coleman, President, Burroughs Adding Machine Co.*

"The future of our civilization . . .

". . . depends upon the quality of the men who will . . . lead our business . . . in the years ahead of us more than any other single factor. . . . If American business can secure a level of future leadership which will make a mechanized economy acceptable to a free people, it will save the peace of the world."—*Lyndall F. Urwick, Chairman, Urwick, Orr & Partners, Ltd.*

"You can't operate . . .

". . . successfully unless you have a clean-cut knowledge of that for which you are responsible. And most job descriptions are much too long. They are couched in language which is not understandable. They are overlapping and usually . . . filled with a lot of hopeful aspirations."—*Hiram S. Hall, Vice President, Bigelow-Sanford Carpet Co.*

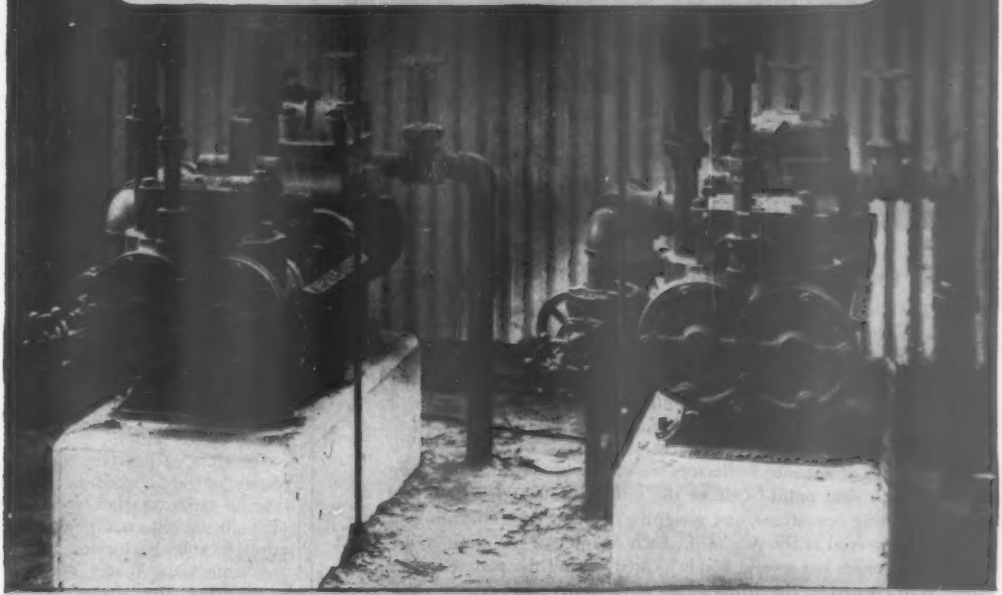
Turn the page

FOR YEARS AND YEARS OF SERVICE

...choose GARDNER-DENVER Duplex Pumps

Check these advantages:

- Can be used with either steam or air power.
- Versatile—give you variable capacities, fluid pressures and speeds from the same installation. For example, a 6 x 4 x 6 pump may be operated at 0 to 118 G.P.M. . . . 0 to 250 lbs. fluid pressure . . . 0 to 90 R.P.M.
- Available with removable fluid liners and valve seats.
- May be fitted for abrasive or corrosive service.



Perking Along Since 1907

A company in New Orleans installed a Gardner-Denver Duplex Pump in 1907—has been using it ever since. They say it is still the best pump in the mill.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

in the new Raybestos-Manhattan Plant

The cleanliness that is possible in plants having heavy dust-creating operations is illustrated in the new Raybestos-Manhattan plant in Crawfordsville, Indiana. The fine metallic powders used in making clutch plates and related products provide a potential dust condition that is stopped before it starts by a highly efficient dust control system.

A series of Dustube Collectors are used with adequate hooding at each dust point. One of the units ventilates batching and screening operations, and weighing, loading and unloading of the material at the pug mill. Each of the two hydraulic molding presses has several hoods located around the platen to trap dust created by the filling of the mold cavity and pressing operations. This dust is whisked away to other Dustube Collectors and the collected material is salvaged for reusage.

SEND FOR DUSTUBE CATALOG 372 TODAY

American WHEELABRATOR & EQUIPMENT CORP. **dustube** COLLECTORS

374 S. Byrkit St., Mishawaka, Ind.

YOU MUSTN'T MISS—

Begins on page 300

Incentive Plans Need Mutual Trust

"Any incentive system will fail—or be only fractionally successful—if there isn't mutual trust between the company's management and its employees.

"I believe this to be profoundly true. One of the reasons so many people become sour about incentive systems is that they have ignored this fundamental prerequisite.

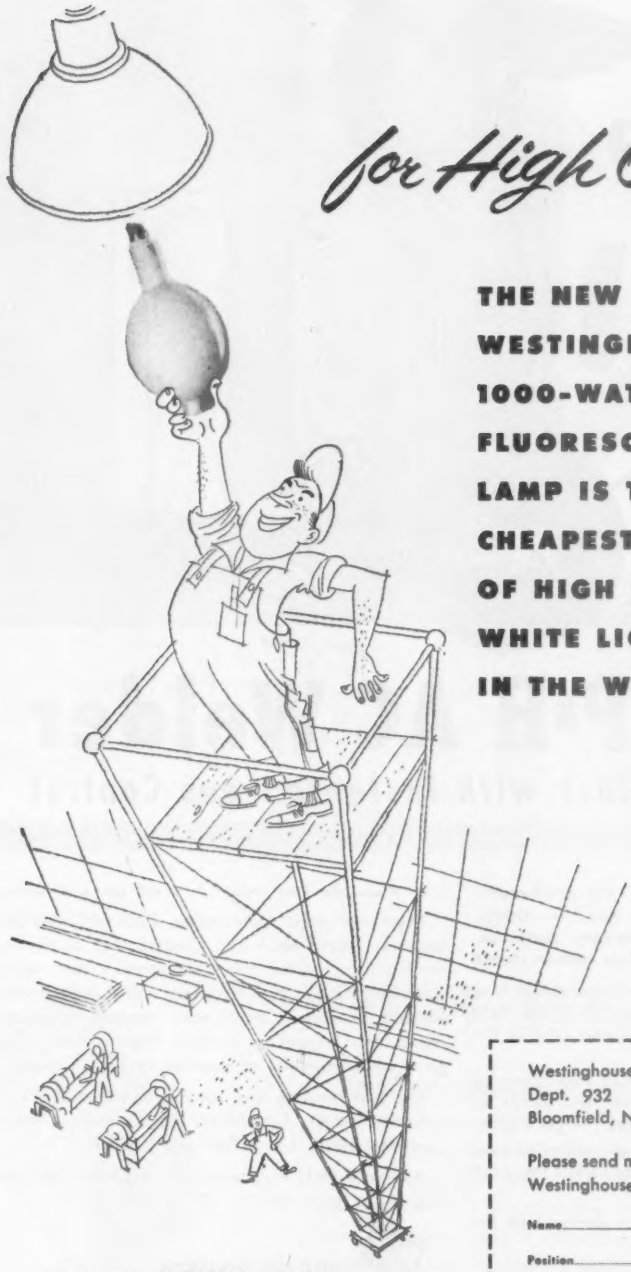
"Industrial engineering *is* a science, of course, and a very important one. But the practical application of the science is an art, because it depends on the willingness of people to make it work. The finest incentive system in the world can result in miserable production if the willingness is missing. We can't set a stopwatch on sullen distrust."—*Walter H. Wheeler, Jr., President, Pitney-Bowes, Inc.*

Manpower Shortage Ahead

"Estimates prepared in a study the Department of Labor published in January indicate that over the next two years, i.e., 1952 and 1953, total manpower requirements for the national defense program and for expected levels of civilian output will increase by 3.5 million.

"In spite of the fact that surpluses of labor exist in certain specific labor market areas, the over-all national manpower situation is already tighter than at any time since World War II.

"Meeting the manpower requirements of the next two years will therefore cause considerable strain upon our manpower resources, which means that even more intensive consideration must be given to manpower supply."—*Robert C. Goodwin, executive director, Office of Defense Manpower.*



for High Overhead

THE NEW WESTINGHOUSE 1000-WATT C-H12 FLUORESCENT MERCURY LAMP IS THE CHEAPEST SOURCE OF HIGH INTENSITY WHITE LIGHT IN THE WORLD

YOU CAN BE SURE...IF IT'S

Westinghouse

Westinghouse Lamp Division
Dept. 932
Bloomfield, New Jersey

Please send me more information about the new Westinghouse C-H12 Fluorescent Mercury Lamp.

Name_____

Position_____

Company_____

Street_____

City_____ State_____

Use a P&H AC Welder

— *the only welder with Instantaneous Control*

Ideal for use with inert gas. Lets you handle "hard-to-weld" metals with ease — aluminum, magnesium, brass, copper, stainless, high carbon, high alloy, and low carbon steels

A touch of your toe instantly gives you the exact heat you need — there's no time lag! That's how this P&H AC Welder gives you the instantaneous control you don't get with other welders.

When you use it on high frequency with inert gas, you can fabricate to close tolerances. And there's no burn-back to oxidize the metal before you get started.

The P&H Inert Gas Welder saves production time these five ways — no other welder makes the work so easy:

1. **Foot switch automatically starts power, high frequency, gas, water.**
2. **Arc starts instantly without touching work.**
3. **Foot control instantly provides exact heat needed *while* welding.**
4. **Foot switch cuts power and high frequency immediately or gradually at completion of weld.**
5. **Automatic time delay shuts off gas and water.**

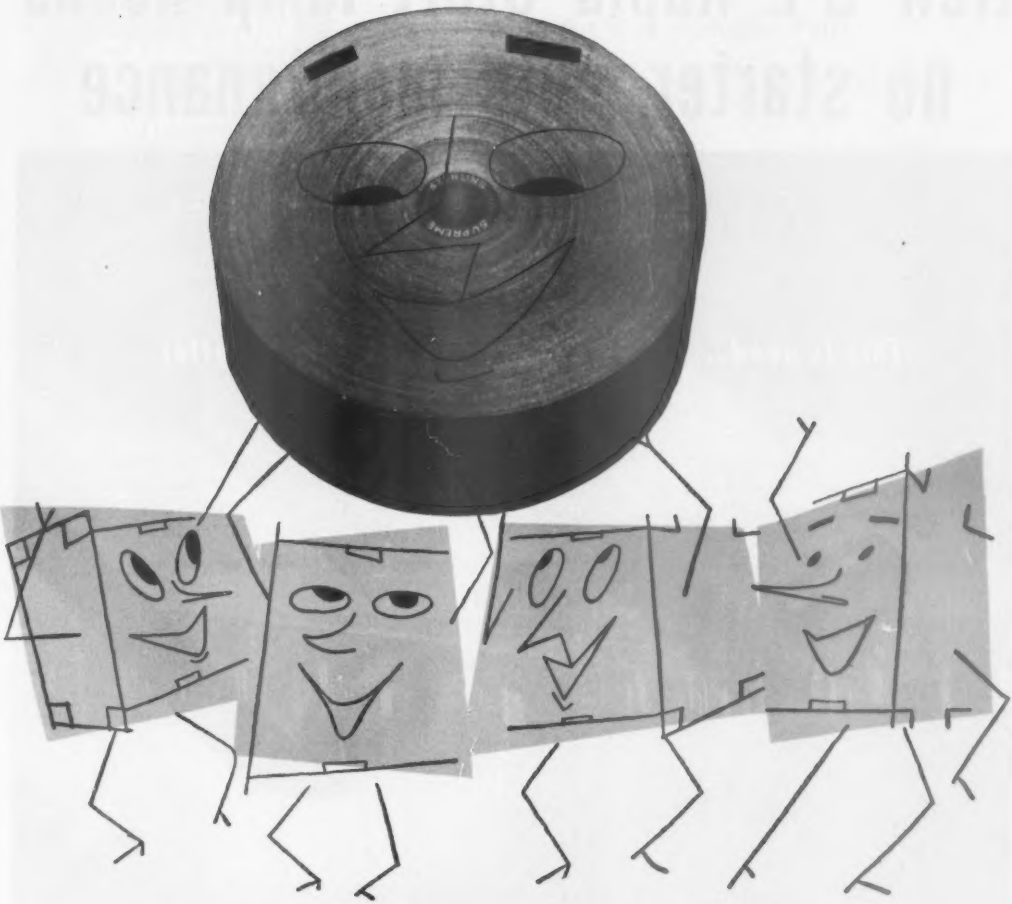
There are other outstanding P&H AC Welder features: P&H Dial-lectric Control that eliminates moving parts — for lower maintenance cost, easier operation. Built-in high-frequency unit that eliminates additional external equipment. Stepless amperage regulation. Unusual arc stability. Selector switch that gives operator choice of standard or high frequency.

Cut *your* welding time for non-ferrous and "hard-to-weld" metals. Get faster, easier, sounder welds — fewer rejects. Use a P&H AC Welder.

Ask your P&H representative for further information — or write us.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4525 WEST NATIONAL AVE. • MILWAUKEE 46, WISCONSIN

POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FABRICATED HOMES



Ask your paper merchant for Sterling Supreme next time you need a finer gummed tape.

OUR HERO!

Sterling Supreme Super-Standard Gummed Tape is a shipper's hero from coast to coast.

There's good reason why Sterling Supreme Super Standard Gummed Tape is a hero. This outstanding combination of kraft paper and a *better* gumming, saves many thousands of cartons from costly damage every day. Properly applied Sterling Supreme Super-Standard Gummed Tape *holds permanently*, does it's intended job perfectly.

THE GUMMED PRODUCTS COMPANY

Offices • *TROY, OHIO* • Mills

Atlanta, Chicago, Cincinnati, Cleveland, Los Angeles, New York, Philadelphia, St. Louis

New G-E Rapid Start lamp needs no starter, cuts maintenance

IN THE NEW RAPID START lamp circuit G-E has been able to eliminate the starter required in standard lamps to pre-heat the cathode. For that reason, maintenance is even easier, more economical than before.

This new General Electric *Rapid Start* lamp was made possible by two G-E developments: an improved triple-coil cathode that replaces the double coil in standard fluorescent lamps, and a *Rapid Start* ballast. Together, they give General Electric *Rapid Start* lamps almost instant starting and smooth, simple operation.

G-E *Rapid Start* fluorescent lamps are rapidly becoming available. Many leading fluorescent lighting fixture manufacturers are incorporating the new lamps and ballasts in their latest equipment. These two newest developments of G-E research are another reason why you can *expect* the best value from General Electric fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

Notes on a Calendar Pad:

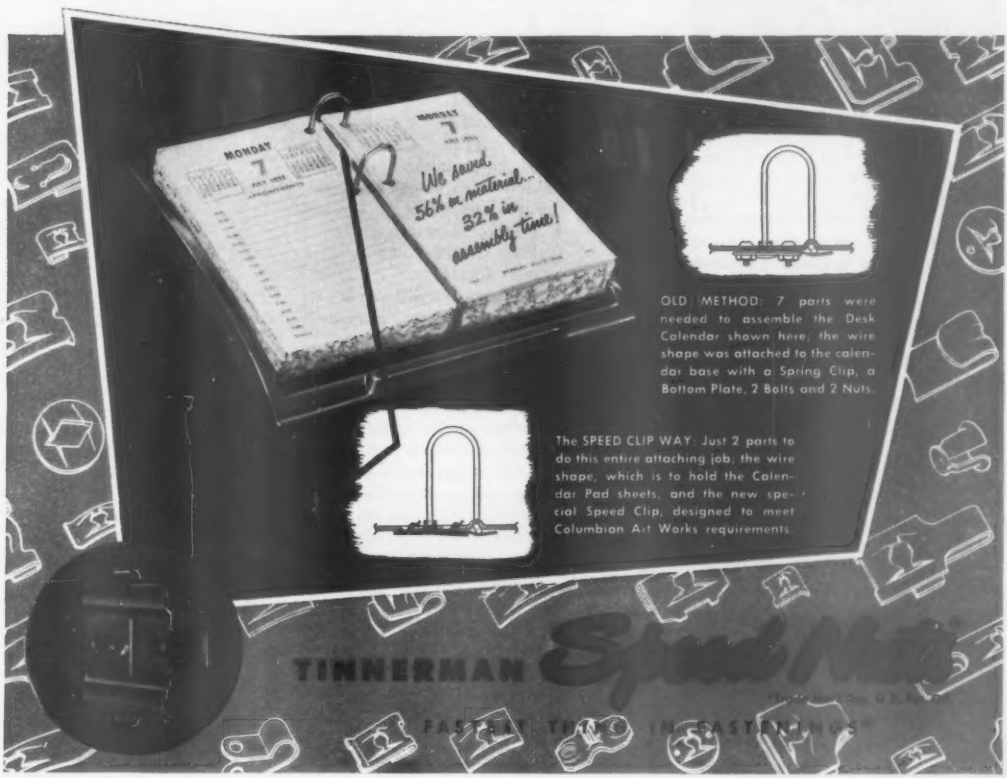
"We saved 56% on material... 32% in assembly time!"

Desk Calendar Manufacturer makes "up-to-date" Savings by switching to Tinnerman Speed Clips

Here's how Columbian Art Works, of Milwaukee, Wisconsin, makers of quality desk calendars, recently checked their own production methods and picked up this amazing time and material savings! For many years they used 6 parts, plus a wire arch brace, to assemble and fasten one of their popular calendar pad models. Today . . . the Speed Clip way, this entire operation is done with 2 parts—the wire shape, and one multiple-function, special Speed Clip. The result is a saving of 32% in assembly time and 56% in material costs!

Savings like these are worth thinking about! Before too many sheets are torn from your calendar pad, make a date with your Tinnerman representative for expert advice on fastener engineering. There may be a "SAVINGS STORY" in your fastening assemblies. Meanwhile, write for a copy of the FREE booklet: "SAVINGS STORIES", TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, O. *In Canada:* Dominion Fasteners, Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S.A., 7 rue Henri Barbusse, Levallois (Seine), France.

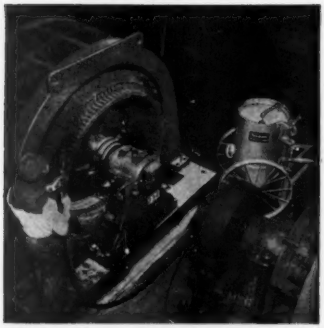
Whatever you make—from Calendar Pads to Clothes Dryers—think first of TINNERMAN for better Fastening Engineering.


MONDAY
7
We saved 56% on material... 32% in assembly time!
OLD METHOD: 7 parts were needed to assemble the Desk Calendar shown here; the wire shape was attached to the calendar base with a Spring Clip, a Bottom Plate, 2 Bolts and 2 Nuts.
The SPEED CLIP WAY: Just 2 parts to do this entire attaching job, the wire shape, which is to hold the Calendar Pad sheets, and the new special Speed Clip, designed to meet Columbian Art Works requirements.
TINNERMAN

Pangborn SAVES

90.9% on materials
66.7% on labor
in cleaning motors!

. . . reports user of Pangborn Corn Cob Blast Machine



Cleaning Duplicate 500 hp Synchronous Motors		
	Material	Labor
Solvent Method	$55.00	120 hrs.
PANGBORN Method	5.00	40 hrs.
SAVING	50.00 (90.9%)	80 hrs. (66.7%)

Remarks: With Solvent, drying period took an additional 8 hours.

ACTUAL cost-time records prove that the portable Pangborn AC-4 "Corn Cob" Blast Machine scours armatures, parts, frames, coils, etc., in ⅛ the time of other methods. In addition, materials and labor costs are drastically cut, toxic dangers are eliminated, and there's no waiting for parts to dry.

Soft, 20-mesh corncob grits do the job with 40-lb. air pressure, whisking away grease, oil, paint flakes, etc. FOR FULL INFORMATION on how the Pangborn AC-4 can help you, write us and tell us what you clean. Address: PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

Test Your Reading Ability

Answer the questions below *after* you have read "Why Gamble With Fire?" on page 126. Correct answers on page 330.

1 · What's the author's main point?
——a. New fire hazards are constantly arising and need controlling
——b. Basic principles, known for years, are being ignored
——c. Most plants still lack know-how to cope with fire
——d. Today's complex plants are harder to protect

2 · How much did fires cost U. S. industry last year?
——a. $1.3-billion
——b. $860-million
——c. $302-million
——d. $112-million

3 · How many industrial fires cost over $250,000 last year?
——a. 53
——b. 102
——c. 187
——d. 516

4 · What's the recommended way to identify fire alarms?
——a. Good big signs
——b. Red lights
——c. Fluorescent arrows
——d. Blue lights

5 · One main conclusion is that most disasters are the result of:
——a. Some one little careless act or omission
——b. Tardy alarm services
——c. A combination of neglected principles
——d. Ineffective supervision of productive processes

6 · How many of 1951's worst fires occurred during non-operating periods?
——a. One-third
——b. One-half
——c. One-eighth
——d. Three-quarters

7 · Sprinklers have been 96% good. What's the main reason for the 4% failures, according to the author?
——a. Poor installation
——b. Poor maintenance
——c. Poor locations
——d. Poor component parts

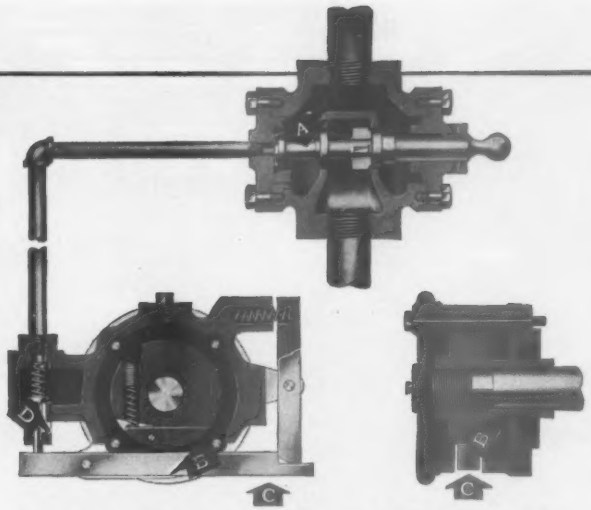
8 · Which one of these "obvious" rules do watchmen most often violate?
——a. Turn in alarm promptly
——b. Know locations of all extinguishers
——c. Never skip a station on patrol
——d. Never smoke on job

9 · Which one of these is not recommended by the author for modern assembly-line operations of very large area?
——a. Segregate special hazards
——b. Special stress on detection and control facilities
——c. Regular worker participation in fire drills
——d. Limit areas to minimum size absolutely necessary

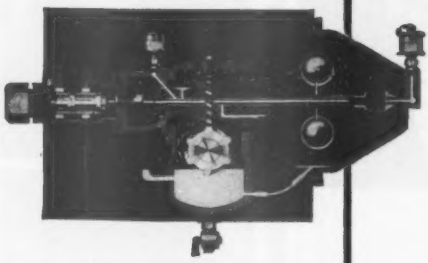
10 · Which one of these is not a basic principle of industrial fire prevention?
——a. Prompt fire detection
——b. Adequate fire brigade training
——c. Prompt alarm transmission
——d. Effective fire extinguishment
——e. Subdivision of fire areas

Turn the page

Only Coppus Turbines offer you *a pilot operated* excess speed safety trip



The constant speed governor on Coppus Turbines, plus this Excess Speed Safety Trip, gives you extra protection for your turbine investments. Here's how it works. When steam is turned on, pressure opens valve A fully. When excess speed is reached, centrifugal force throws weight B against lever C lifting pilot valve D. This releases pressure in back of valve A, closing this valve instantaneously, to shut off the steam. Safety trip can be tested easily while turbine is running by manually tripping and resetting lever C.



Sectional view showing lubricating system of fully enclosed Coppus Constant Speed Governor. Governor head acts directly on stem of steam admission valve. No external levers required. Ball bearing construction eliminates end play and gives frictionless operation.

Coppus Turbines ranging from 150 hp down to fractional in 6 frame sizes

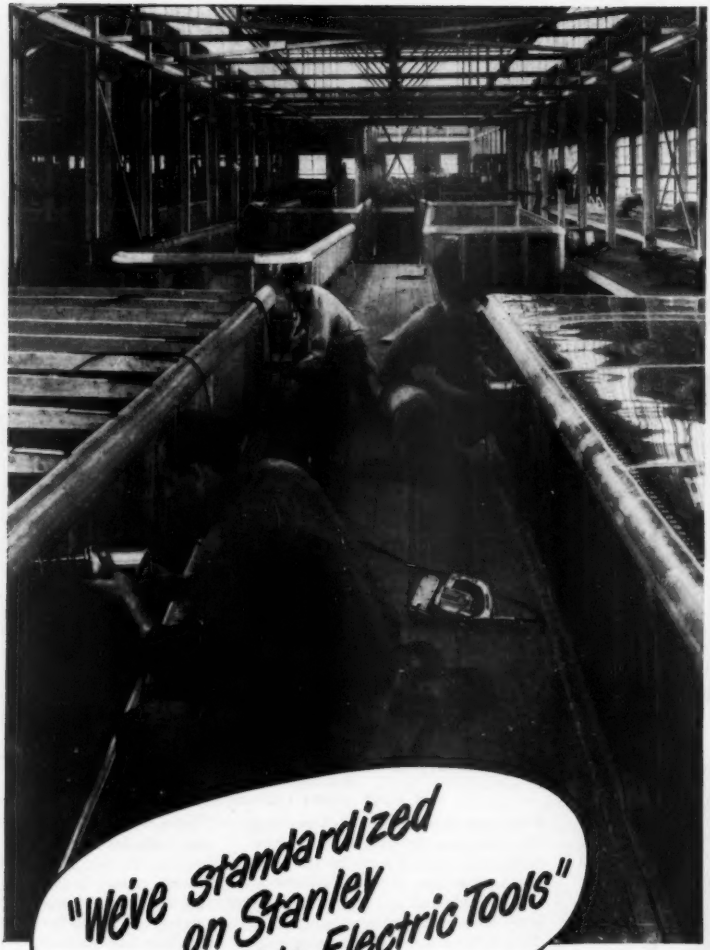
CUT YOUR COSTS PER HORSEPOWER

When you choose from the Coppus Steam Turbine line, you get the right size for your requirements . . . and make substantial savings on *any* size from the 150 hp turbine down to the smallest. Low in first cost, Coppus Turbines save you more money in the long run. Operating and maintenance costs are kept low by such other features as: large number of steam nozzles, controlled individually by manually operated valves; hard chromium plating on shaft at the stuffing box; replaceable cartridge type bearing housings; optional carbon ring packing assembly for back pressures up to 75 pounds.

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORPORATION, 110 Park Ave., Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES



"We've standardized on Stanley portable Electric Tools"

reports—

BROWN EQUIPMENT & MANUFACTURING CO., Westfield, Mass.

leading manufacturer of aluminum trailer truck bodies.

"Building trailer truck bodies demands tools that will take hard work, rough handling all day . . . every day. Our experience has proved that Stanley portable Electric Tools give us just that kind of service." And Brown Equipment & Manufacturing Co., a division of Associated Transport Inc., the world's largest trucking concern, further states that "the savings made possible by using these tools have repaid their original cost many times over. Yes, Stanley portable Electric Tools are standard equipment with us."

See your STANLEY distributor or write for information to: Stanley Electric Tools, 407 Myrtle Street, New Britain, Conn.

Stanley Sander-Grinders are used to smooth out rough trim joints.

Tricky cuts in extruded aluminum are made quickly and easily with Stanley Safety Saws.

Every day Stanley Electric Drills bore hundreds of holes in aluminum and steel. A continuing job that requires drills of sturdy design . . . long life.

STANLEY

Reg. U.S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

TEST YOUR READING ABILITY

Begins on page 328

SCORING INSTRUCTIONS

Be sure to figure all three of your scores: comprehension, speed, and reading index. For a full explanation of these scores, as well as information on how to improve your scores, see "How to Read Better and Faster," on page 84 of FACTORY's October 1951 issue. If you've passed your copy along to someone else, write the Editor for a reprint.

Comprehension score: Just add up the percentage credits for each of the questions you answered correctly.

Speed score: Refer to your note of how long it took you to read the article. Convert the time into seconds. Divide the result by 10. This answer you divide into 2338 (number of words in the article). Finally, multiply this last result by 6. This will give your reading speed in words per minute. (If you recorded your time in decimal minutes, you can get the result directly by dividing the time into 2338.)

Reading index: To find your reading index, multiply your speed in words per minute by your percentage of comprehension and divide by 100. Do not figure reading index if your comprehension score is less than 75%. With lower comprehension, the reading index is not valid.

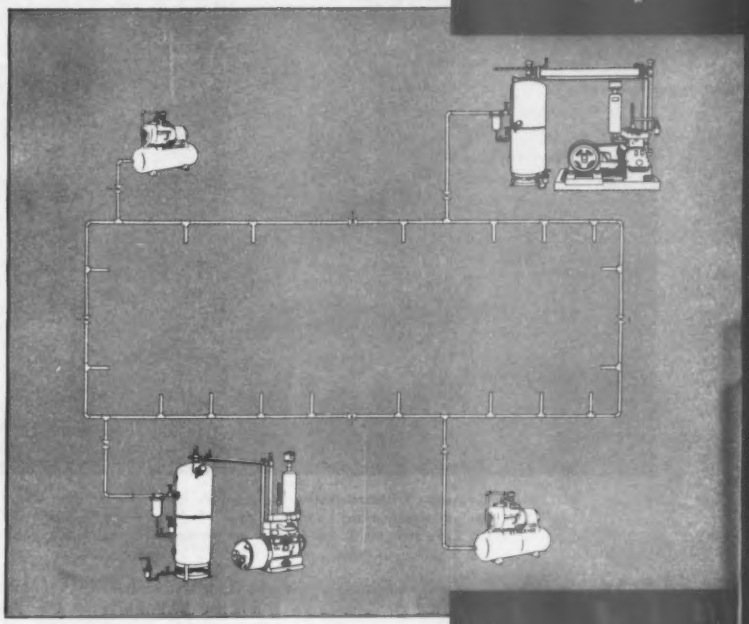
Now check yourself against this table of reading indexes: 400 or more (excellent); 300-399 (very good); 250-299 (good); 200-249 (fair); 150-199 (poor); below 150 (very poor).

Let us know how you came out on your reading score. A post card will do — sign it or not.

ANSWERS TO TEST QUESTIONS

Q	A	Credit	Q	A	Credit
1	b	20	6	a	5
2	c	10	7	b	10
3	b	5	8	a	10
4	d	10	9	c	5
5	c	15	10	b	10

HOW TO SAVE MONEY ON YOUR... AIR COMPRESSOR INSTALLATION



The perfect, money-saving, "inside-the-plant" air compressor installation is the Schramm unit system . . . whereby, in a minimum of space, you install one, two, three or more Schramm air compressors, according to your air needs, and operate them singly, or separately, as the load requires. Here is how such an installation saves you money:

1. Low In Initial Cost. No foundation cost, cuts by half the installation price. Can be transported into the plant on standard material handling equipment, set in place, grouted, bolted down, ready for use in matter of hours!

SCHRAMM UNIT SYSTEM

2. Low in operating cost. The losses when operating a large compressor at light load are very great. On the other hand, the vertical compressors in unit system can be equipped with automatic start and stop control, set at proper pressure ranges, so as to regulate the air output according to load demand. Unit system installations allow you to use one, or as many of the compressors as you need.

3. Low in maintenance cost. The unit system allows you, when one of the compressors is shut down for minor repairs, to continue operating the other compressors without affecting the overall capacity of the plant to any appreciable extent. *For full details write us today.*

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The Compressor People

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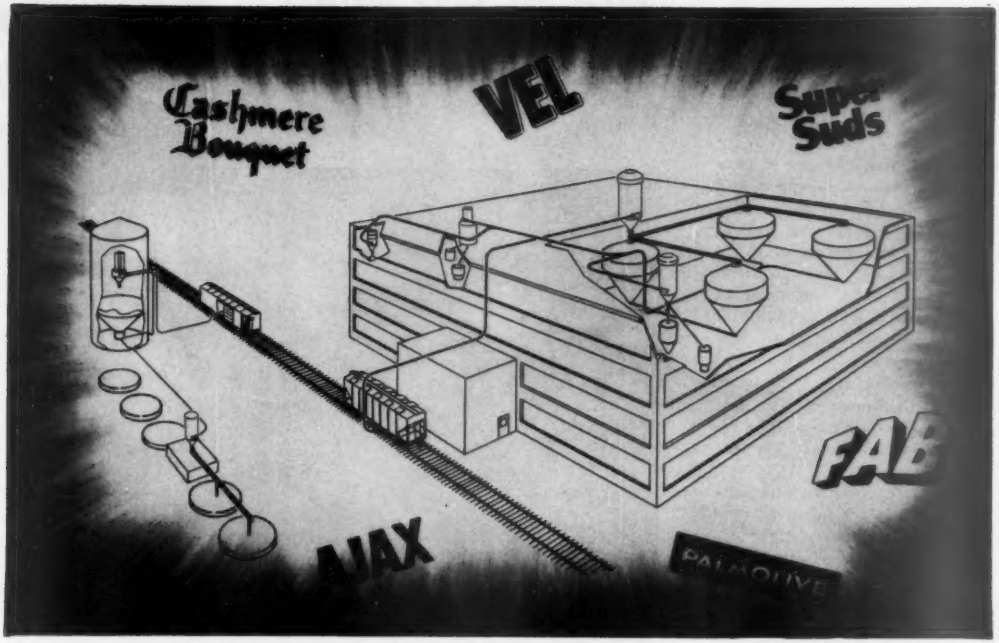


Diagram of Dracco system at Colgate's Jeffersonville plant where the "Airstream" Conveying technique has been used over 15 years. Main "in-plant" system unloads to storage (at 12½ tons/hour), withdraws from storage and transfers to production (at 5 tons/hour).

MASS HANDLING *Cleanliness* AT COLGATE

At their Jeffersonville (Indiana) soap and detergent plant, the Colgate-Palmolive-Peet Company utilizes Dracco "Airstream" Conveyors extensively to simplify bulk materials handling.

Soda ash, tetra-sodium pyrophosphate and other chemicals are unloaded to storage from railroad cars by the "Airstream" system. The same system also transfers materials from storage to process equipment, thereby eliminating many manual operations and improving production economy.

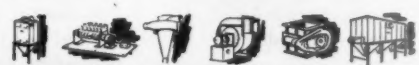
Throughout the plant the Dracco materials handling equipment has been designed to integrate smoothly with Colgate's manufacturing operations. The three Dracco Receivers in the distribution system were strategically placed over the three separate production areas to discharge materials to mixing tanks by gravity. Placement of the Dracco equipment on the roof permits full utilization of all production space.

The handling flexibility and savings produced at Colgate are typical of Dracco installations throughout the process industries.

Write Dept. F-10, Cleveland 5, Ohio for the Dracco Airstream Conveyor Bulletin 529.

DRACCO CORPORATION

Harvard Ave. and East 116th St. · Cleveland 5, Ohio



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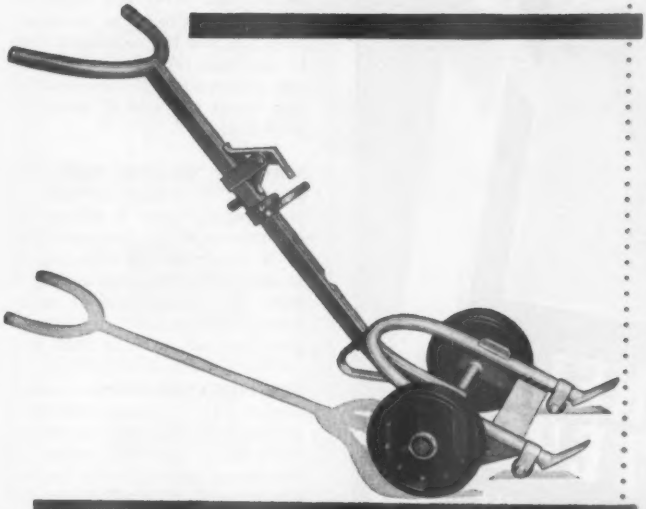
Airstream CONVEYORS · DUST CONTROL EQUIPMENT

Multi-Purpose Colson TRUCKS

Save American Industry Time and Money



The COLSON Corporation

ELYRIA, OHIO

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● The COLSON Universal Drum truck, shown here is the answer to fast, safe handling of drums and barrels. It locks any size container between the adjustable chimb hook and pick-up tips, lifts it easily and carries it with the weight evenly balanced over the wheels.

Other time and labor-saving COLSON equipment includes hand trucks, platform trucks, lift-jack systems and wheels and casters for every kind of industrial application.

Whether your materials-handling requirements are *standard* or *special* you can count on precision-built COLSON equipment to meet your requirements *exactly*. Write us or consult the yellow pages of your phone book (under "Casters" or "Trucks: Industrial") for the COLSON office near you.

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NEW MATERIALS

A DUAL-PURPOSE OIL is what you may need for internal combustion engines that are temporarily taken out of service for storage or shipment. Such an engine must be properly lubricated for service before and after the stand-by period. Yet it must be protected from rust and corrosion while not in use. Both jobs can be done by one preservative oil, developed by The Texas Co., 135 E. 42nd St., New York.

SYNTHETIC CERAMIC FIBER that promises to replace asbestos in many applications is offered by Carborundum Co., Niagara Falls, N. Y. Trademarked Fiberfrax, it is said to resist temperatures up to 2300 F. without loss of properties, and does not soften at temperatures approaching 3000 F.

NEW INSULATING RESINS — called Scotchcast — to seal electrical components designed for critical applications are being made by Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul. Scotchcast No. 1 sets at 250 F. in 4 to 8 hours, and No. 2 sets at room temperature in 3 to 6 hours.

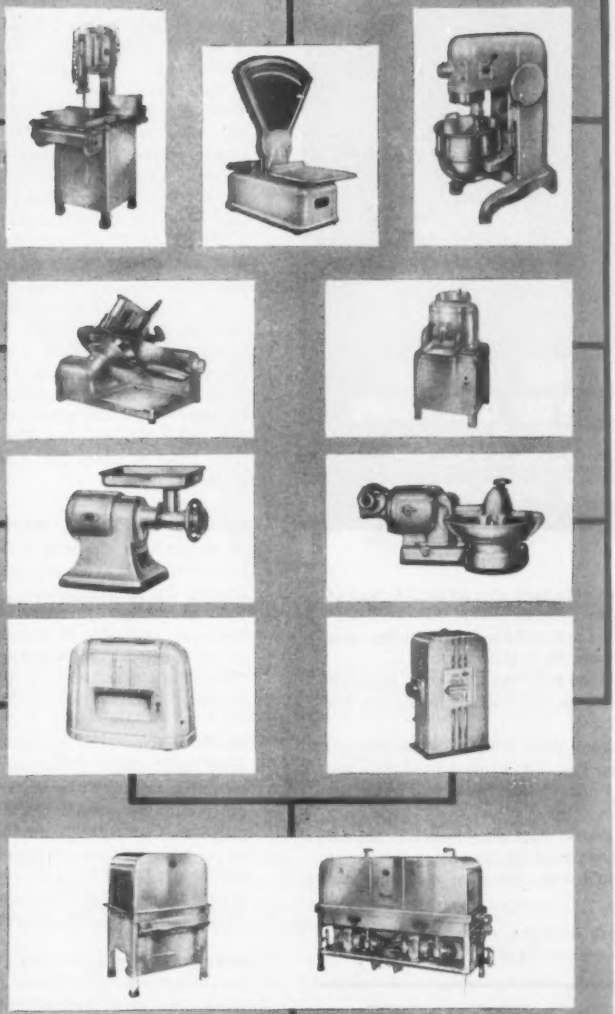
NEW SILVER BRAZING FLUX spreads over joint easily and is ideal for torch application where heating cycles are low, according to Goldsmith Bros. Smelting & Refining Co., 1304 W. 59th St., Chicago 36. G-B No. 99 comes dehydrated and can be mixed in small batches as needed.

HEAT-RESISTANT PAINT developed by Speco, Inc., 7308 Associate Ave., Cleveland 9, will withstand temperatures up to 1700 F. and air-dry in 30 minutes. It fuses with the surface of the metal on which applied and forms solid copper coating that contracts and expands with temperature changes.

Turn the page

Clean Plate to Clean Plate

Hobart Charts the Way to Mass Feeding Efficiency



Increased production is the watchword everywhere today. In the field of mass feeding, efficient output is based on *your* food and kitchen machine plan. So plan *your* operation with the complete line of Hobart products designed to bring highest standards to the job.

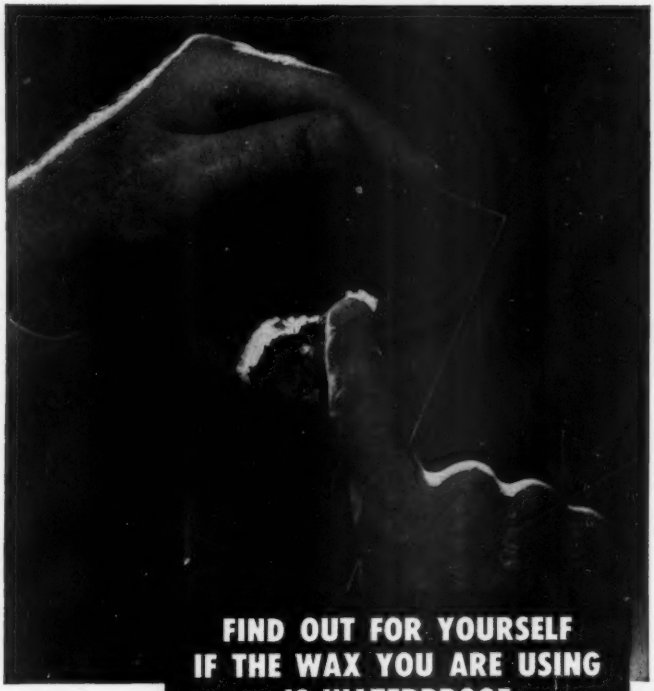
You can find every machine shown here proudly wearing a Hobart nameplate—every one designed, manufactured, guaranteed and serviced by the oldest name in the business. You'll find most of them in a wide range of capacities and sizes—to bring peak efficiency and ease of planning. And you'll find every one of them *clean in design and clean in performance*—so carefully designed and ruggedly built that many kitchen operators still use Hobart products over 20 years old. And it's seldom that any of them replace a Hobart with anything but a *new* Hobart. Let your covenient local Hobart representation give you complete specifications, data and information on the complete Hobart line. Just call—or write . . . . . *The Hobart Manufacturing Company, Troy, Ohio.*

Trade Mark of Quality Hobart for over 50 years

Food Machines

THE HOBART MANUFACTURING COMPANY
TROY, OHIO

The World's Largest Manufacturer of Food, Kitchen and Dishwashing Machines



Put a few drops of any liquid wax on a hard, dry surface. A piece of glass is fine. Spread the wax to about the size of a half dollar. Let it dry overnight. Then put a drop of water on the wax and wait about ten minutes. Now wipe the water off with your finger and note the results.

When you do this with Holcomb Water Proof Wax, the water comes off but the wax stays on. It doesn't even streak the wax—because water does not re-emulsify Water Proof Wax.

Floors protected with Holcomb Water Proof Wax can be wet-mopped many times without washing off the wax. This wax is tough, too—does not scar, chip or discolor. And it patches perfectly where heavy foot traffic has worn it thin.

Ask your nearby Holcomb Serviceman for a demonstration. See for yourself how long this "wonder" wax lasts. Find out how many re-waxings you can eliminate, how much time you'll save. You'll be agreeably—*and profitably*—surprised.

Research Laboratory and Factory: 1601 Barth Ave., Indianapolis, Ind.
Branches: New York 18 and Los Angeles 21

J. I. HOLCOMB
MANUFACTURING COMPANY
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NEW MATERIALS

Begins on page 334

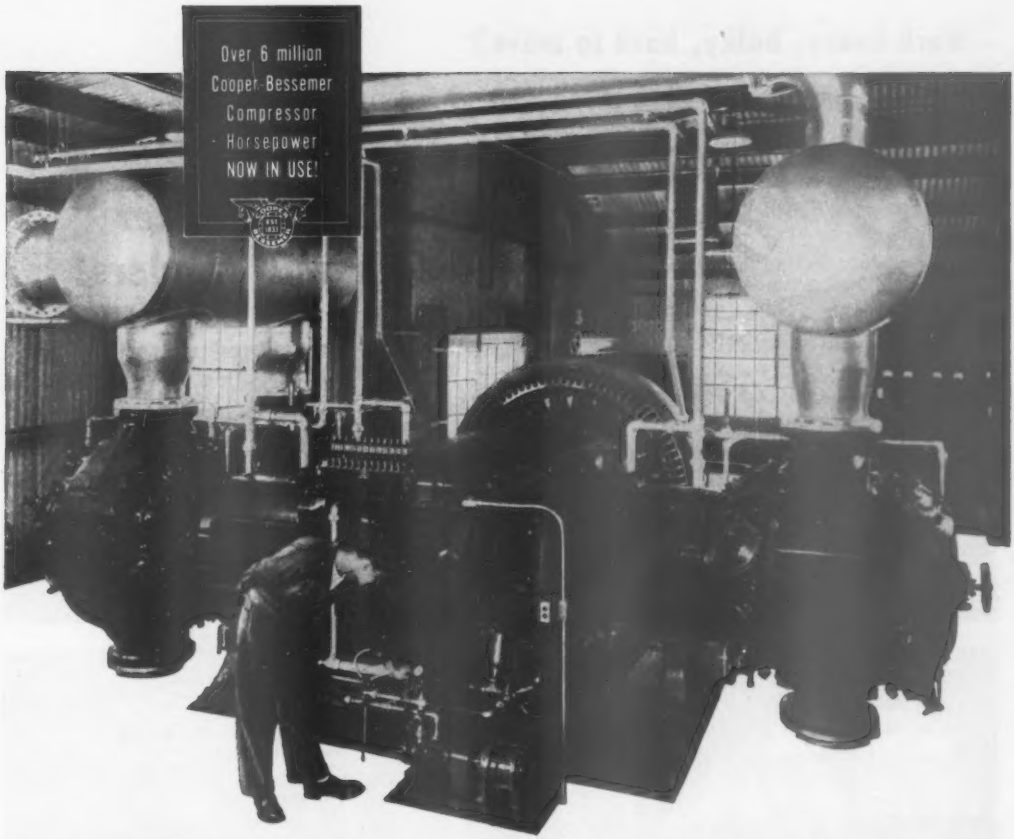
TURCO 3232, a new liquid steam-cleaning compound, can be used safely on reactive metals and painted surfaces. And it will remove light to medium soil deposits without leaving white streaks or solution residues, says Turco Products, Inc., 832 E. 62nd St., Los Angeles 1. Non-flammable, it emits no disagreeable fumes. And its active, soapless lather gives the operator visual control of compound strength.

NEW DETERGENT cleans aluminum, anodized aluminum, and magnesium parts in power-washing equipment. Kelite PWB No. 81 removes all types of soil and manufacturers' markings in about 1 minute. It is non-foaming, non-corrosive, and has good stability and long life. Kelite Products, Inc., 1250 N. Main St., Los Angeles 12.

INSULATING SHEET MATERIALS, comparable in strength to fabric-base materials, are being made by Rogers Corp., Manchester, Conn. Two grades — Duroids 700 and 800—are available in thicknesses up to 3 inches. The heavy-gauge, fibrous material can be drilled, tapped, machined, or sawed.

KELITE M-2, for the protection of mild steel from corrosion after cleaning, is said to be superior to petroleum oil used for the same purpose. Can absorb up to 11% of its own volume in water and can be used without prior drying, according to Kelite Products, Inc., 1250 N. Main St., Los Angeles 12.

NEGASTAT eliminates static electricity by actually replacing electrons on the surface of the material treated, according to Phillips & Phillips Corp., 343 S. Dearborn St., Chicago 4. It contains no glycerin or soap and leaves no gummy deposit.



FOR PFIZER ANTIBIOTICS . . . *the "healthiest" of compressors*

AT Chas. Pfizer & Co., Inc., Vigo plant in Terre Haute, antibiotic processing is a *continuous* operation, requiring lots of air. And since air failure would be disastrous, it was essential to have the most reliable compressor obtainable. The Cooper-Bessemer unit shown above was installed over a year ago; has been in virtually constant 24-hour-a-day operation ever since.

There's all kinds of proof that you can't top a Cooper-Bessemer compressor for reliability. What's more, its modern, compact design, with vibration-free opposed action, means smoothest operation, simplified maintenance, and substantial savings in space and foundation requirements.

Send for the latest bulletin, shown here, or check with the nearest Cooper-Bessemer office on the money-saving unit just right for your needs.

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Covers Cooper-Bessemer Type M compressors, 200 to 1000 hp. Other bulletins covering still larger size units are also yours for the asking.

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Officials of the U. S. Tobacco Co., and the Nashville Fire Department inspect the Randolph Automatic System installed on giant dust collector.

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As in the U. S. Tobacco installation, Randolph Systems, in addition to automatically killing the toughest fires in split seconds, can also be equipped with duct and door closers, motor, fan and machinery shut-offs, warning alarms and other auxiliary safety devices. Systems are designed for both local application or total room flooding and are ideal for dip tanks, baking ovens, spray booths and hundreds of other applications.

Battery of Randolph CO_2 Cylinders in U. S. Tobacco system.

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BOOKS

For Plant Engineers

INDUSTRIAL WASTE TREATMENT

By **EDMUND B. BESSELIEVRE.** McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. Illustrations, charts, tables, references, bibliography, index. 391 pp. $7.

If you have an industrial waste problem, this book should point the way to a satisfactory and economical solution for your troubles.

It gives you a clear look at the background causes, legal factors, methods, and costs.

Some of the important questions you will find answered are:

- What is—and what causes—an industrial waste problem?
- Can an engineer or specialist help you?
- How are wastes analyzed and treated?
- Should your plant treat its own wastes, combine with other plants, or use municipal facilities?
- Can you develop a low-cost treatment plant and recover usable substances from your waste?

These answers—backed up by dependable data and information—will give you an approach to the analysis and solution of your own problems.

Includes a section covering federal and state laws concerning the treatment of industrial wastes.

Book Briefs

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The practical do's and don't's of corporate contributions to educational, scientific, and welfare groups under the 5% tax exemption privilege of the

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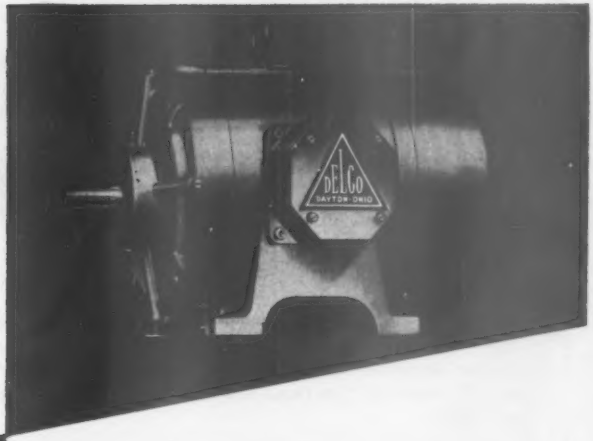

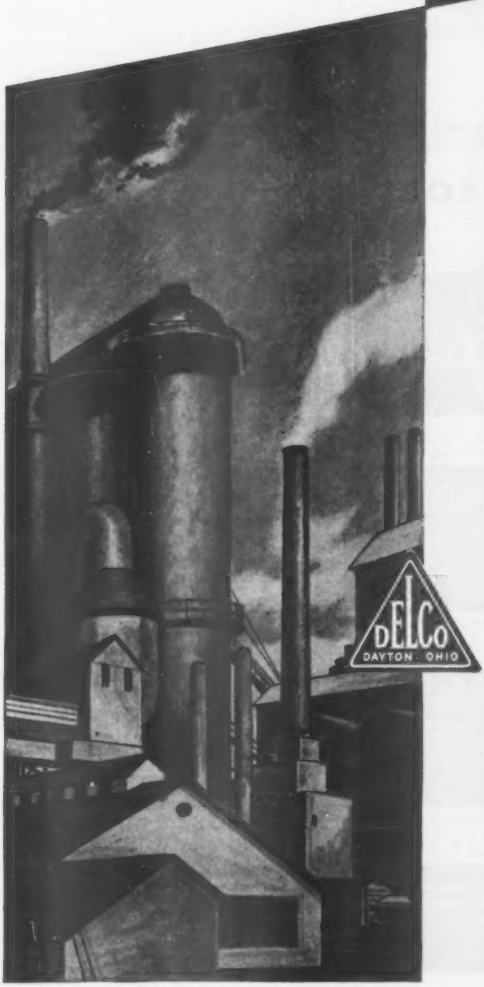

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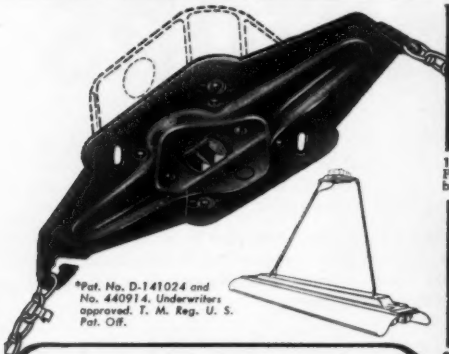

*Pat. No. D-141024 and No. 440914. Underwriters approved. T. M. Reg. U. S. Pat. Off.

1. Connect wires to receptacle. Fits standard 4" or 3¼" outlet box or plaster ring.

2. Screw hanger to outlet box—only two screws needed. No centering, punching, or drilling. Screwdriver only tool needed.

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Hydee Hanger: complete with receptacle, two 5-ft. chains, "S" hooks and clips—

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BOOKS

Begins on page 340

Internal Revenue Code. Tells you how gifts can be made to yield maximum benefits to both the recipient and donor. Contains sections by 26 experienced donors and recognized experts. Edited by Beardsley Ruml and Theodore Geiger. National Planning Assn., 800 21st St., N.W., Washington 6, D.C. 415 pp. $6.75.

HANDBOOK OF MOTION PICTURE TECHNIQUE FOR BUSINESS MEN

If you're thinking of making films, this handbook should take some of the mystery out of motion picture making. It tells you what can, what cannot be done, and how best to do it—in language you can understand. Includes an extensive glossary of useful terms and information. It also covers costs, business arrangements. By Charles Curran. Times Square Productions, Inc., New York 36. 53 pp. $2.50.

ILLUSTRATED PETROLEUM DICTIONARY & PRODUCTS MANUAL

Useful information for sellers, buyers, and users of petroleum products—especially those who don't have a technical background in petroleum. Plenty of illustrations to help the layman. Edited and published by Petroleum Educational Institute, 9020 Melrose Ave., Los Angeles 46. 502 pp. $8.

PERSONNEL PRINCIPLES AND POLICIES

Thirty readable chapters — each includes a simple case problem — focused on the "why" of modern manpower management. By Dale Yoder. Prentice-Hall, Inc., 70 Fifth Ave., New York. 602 pp. $7.95.

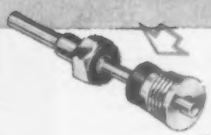
Turn the page

All of the Carbon Dioxide

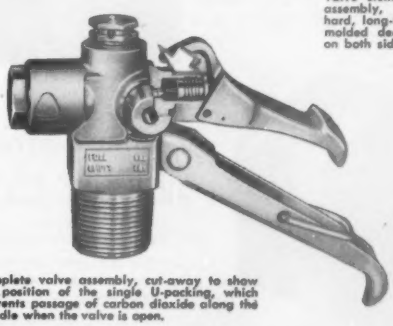
Fights Fire

because of a special U-Packing you can place on a dime!

Photograph shows special U-type synthetic packing enlarged 3½ times. Assembly locates this packing on the spindle.



Valve stem and poppet assembly, showing the hard, long-wearing seat, molded dead-even level on both sides.



Complete valve assembly, cut-away to show the position of the single U-packing, which prevents passage of carbon dioxide along the spindle when the valve is open.

LEAKING valves were causing real trouble to this manufacturer of carbon dioxide portable fire extinguishers. His valve design was OK: a plunger-actuated poppet providing quick, full flow, opened by depressing the spindle (by means of a lever on the carrying handle) and returned to the closed position by a strong spring.

His trouble lay in his seals — a mechanical packing on the spindle and a poppet washer for the seat. Tests showed that they leaked, permitting the carbon dioxide to escape.

Sample packings with the valve assembly were sent to G&K–INTERNATIONAL for study. As a result of engineered research, synthetic rubber compounds were developed, impervious to carbon dioxide and capable of withstanding long periods of aging.

For the spindle, G&K–INTERNATIONAL engineers designed a special U-shaped packing, leak-proof and flexible to form a perfect mechanical seal between the stem and the packings recess.

The poppet seat called for a hard, tough rubber, molded dead-even-flat on each face. It had to form a compression seal that would remain tight for years, if need be.

Results? To quote this manufacturer, "The valves passed Underwriters and U. S. Navy tests and are doing a wonderful job."

* * *

Be sure you get the correct type of packings made from compounds engineered for your requirements. Send us complete specifications of your packings needs and G&K–INTERNATIONAL Engineers will help you solve your packings problems — before trouble starts.

second century G and K – INTERNATIONAL

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INTERNATIONAL PACKINGS CORPORATION
Bristol, New Hampshire

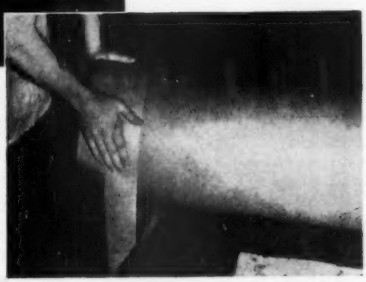
Angier

Reinforced

the SNAKE TAPE *way*

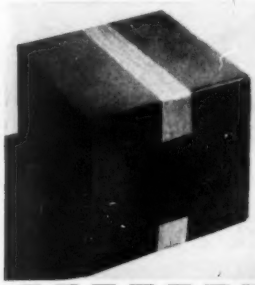
Big CARTONS

Now these big cartons are sealed *faster* (only two strips of Snake Tape are used.) They're sealed *stronger* because reinforced Snake Tape has strap-like strength. — *Atlas Collapsible Tube Co.*



Rolls

End pads for Sloane-Blabon linoleum are held securely in place by Angier's waterproof, reinforced tape. Saves damage claims. Easily dispensed by any "cut-off" type machine, Snake Tape is made in 6 widths.



Your CARTONS

Center-seam seal with Snake Tape for a *stronger* closure in one-third the time! The "2-strip" way with reinforced Snake Tape is accepted for parcel post, railway express, air express and truck shipments. Accepted for carload and less than carload rail shipments where rule 5, section 1(c) of Uniform Classification applies.

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BOOKLETS

Begins on page 340

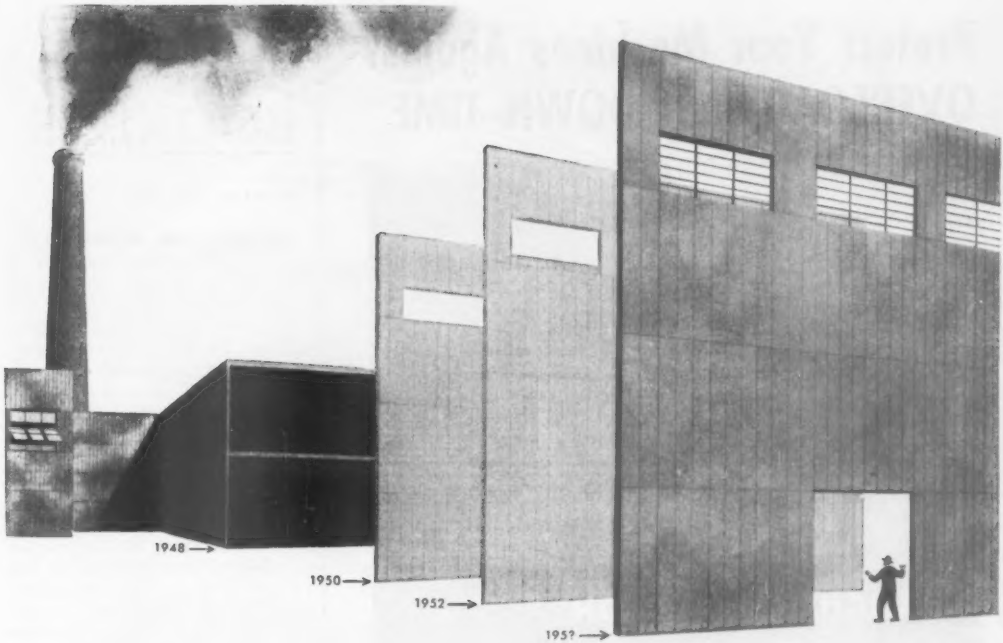
ORGANIZING FOR IMPROVED PRODUCTION AND COST CONTROL. American Management Assn., 330 W. 42nd St., New York 36. Articles of lasting reference value presented at the Manufacturing Conference of the AMA at the Hotel Statler, New York, April 7-9, 1952. By top cost authorities and executives. Includes panel discussion on organization and control of a successful maintenance function. 68 pp. Members, $1; nonmembers, $1.25.

AMERICAN SAFETY STANDARDS. American Standards Assn., 70 E. 45th St., New York 17. An up-to-date numerical list of American safety standards, both approved and under development. New, comprehensive subject index for easy reference. Each listing gives you a brief outline of standard and its scope, with requirements and recommendations. 22 pp. Free.

POWDER METALLURGY TODAY. F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20. A spur and miter produced at 20% of its former cost. A helical gear made with 18 less machining operations. Other machine parts produced at a minimum of scrap loss and a reduction of stock inventories. Free.

INDUSTRIAL DISPERSION GUIDEBOOK FOR COMMUNITIES. U.S. Department of Commerce, Washington 25. Explains how manufacturers planning new facilities can limit the attractiveness of their communities and plants as atom bomb targets by conforming to national dispersion standards. 22 pp. Free.

Turn the page



CASE OF THE WALKING WALL

Twice this wall stepped out to let the plant expand.

It could just as well be twenty times.

You simply take the wall apart and move it further out, saving the materials and money involved in building a new one. That's what they did at Dayton Power & Light.

The walls of this building are locked-together Fenestra* "C" Panels . . . long, strong, steel metal units with glass fiber insulation sealed inside.

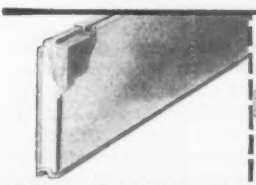
And, if you build *your* new building of Fenestra "C" Panels, you'll see it go up area by area instead of inch by inch.

You'll see your walls rise 16 square feet a leap . . . complete inside-outside, insulated walls. Fine-finished walls that are either prime-painted steel, or aluminum . . . so smooth that dirt and grease can't get a grip. Walls that are noncombustible. Walls that will *walk* when you need extra space.

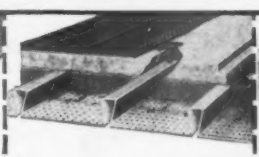
Look at the close-ups of Fenestra Metal Building Panels shown below. Let us explain how they can help you speed the construction of your new building, save structural steel, cut the cost of labor. Write to Mr. Earle C. Hodges, Vice President, Detroit Steel Products Company, Dept. FM-10, 2261 Griffin Street, Detroit 11, Michigan. *Trademark

Fenestra METAL BUILDING PANELS

. . . engineered to cut the waste out of building

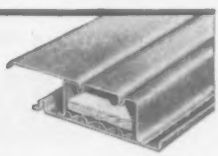


"C" Insulated Wall Panels. Width 16". Depth is 3". Steel or aluminum.



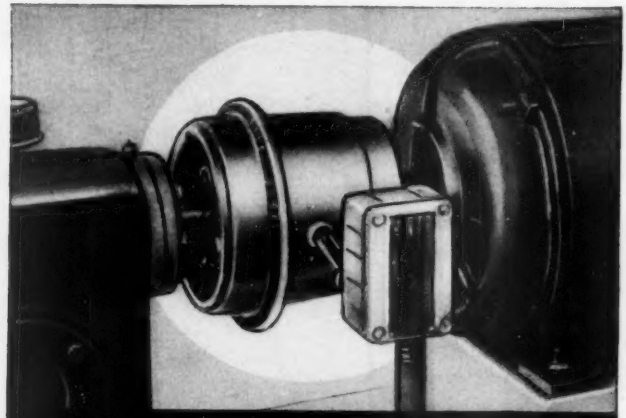
Acoustical Holorib for acoustical-structural roof. Width 18". Depth 1½".

"D" Panels for floors, roofs, ceilings. Standard width 16". Depth 1½" to 7½".



Acoustical "AD" Panels for ceiling-silencer-roof. Width 16". Depth up to 7½".

Protect Your Machines Against OVERLOAD and "DOWN TIME"



ANCHOR-WALDRON

Automatic

Overload Cut Out

also available in Pulley Type Units

With the Anchor-Waldron Cut-Out an automatic device instantly shuts off the motor when an overload occurs; it resets itself automatically. You simply push the starter button—that's all! If the overload has not been removed and the starter button is pushed the cut-out will again block the circuit and again reset itself.

This positive mechanical, electrical and controlled overload cut-out device is adaptable for a wide variation of horsepower. It protects horsepower, eliminates down-time and saves on maintenance work.

Coupling torque range 10 to 2,000 inch-pound.

Pulley type unit torque range 20 to 10,000 inch-pound.

WRITE FOR DESCRIPTIVE CATALOG 51

JOHN WALDRON CORP.

NEW BRUNSWICK NEW JERSEY

Sales Representatives in Principal Cities

For copies of books and booklets reviewed, write directly to publisher listed

BOOKLETS

Begins on page 340

STANDARDS FOR MAGNESIUM. National Fire Protection Assn., 60 Batterymarch St., Boston 10. Calls your attention to fire and explosion hazards in the storage, handling, and processing of magnesium—and tells you what to do about them. Based on tests and actual magnesium fire experience. 16 pp. 25¢.

SALVAGE INDUSTRIAL DIAMONDS. U.S. Department of Commerce, Washington 25. How you can salvage about 50% of all the diamond bort in grinding. And how you can help the nation-wide program of conservation and salvage to meet defense production goals by getting the most out of your diamond supply. 9 pp. Free.

DOW CAUSTIC SODA. The Dow Chemical Co., Midland, Mich. Tells you the story of caustic soda—from the beginnings of the industry to first aid treatment for caustic burns. Includes chapters on the methods of handling and storing, and useful technical data with charts and tables. A handy addition to your reference shelf. 70 pp. Free.

MODERNIZING OFFICE PROCEDURES. University of Illinois, Business Management Service, Urbana, Ill. Brief presentation of basic techniques. Shows you how better office procedures need not be complex—just use some common sense. 26 pp. Free.

PEOPLE ARE MORE IMPORTANT THAN ANYBODY. Wood Office Furniture Institute, 730 11th St., N.W., Washington 1, D.C. A reminder—with a chuckle—that personnel are people. But a serious theme: Good working conditions make happy people, more work. 15 pp. Free.

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gives such protection against

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Only by using gummed tape can you seal cartons *with your company name imprinted on the seal.* Petty thieves cannot pilfer without being detected, for they are unable to replace your exclusive tape. The tape warns your consignee not to accept the carton if its seal is broken. You don't risk blame for careless count when your shipment has actually been pilfered.

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LINDE'S News of Metalworking

Worn Parts Rebuilt Economically by UNIONMELT Welding

Repair of worn tractor parts is most practical and economical with specially developed fixtures on which standard UNIONMELT welding units are mounted. The metal deposited by UNIONMELT welding is so smooth that no grinding or finishing is required. Experience indicates that resurfaced areas will wear as long as new parts.

The Berkeley "Conservall" fixture is designed especially for rebuilding crawler tractor track links or rails without disassembling them. The track is placed in a trough and clamped in position. A LINDE side-beam carriage

Tractor rail links rebuilt in "Conservall" machine by UNIONMELT *welding. Cams automatically control welding action for each link.*

moves the UNIONMELT welding equipment over the positioned track and the welding of each link is automatically started, stopped, and accurately controlled. Rollers, idlers, sheaves, and other circular work can also be welded or resurfaced on another section of the machine.

The "Leader" machine is also available for rebuilding both cylindrical and flat parts. Rollers are rebuilt on top of the machine. Larger parts, such as idlers, are mounted in the chuck at the side of the machine as shown. With the flat work attachment, parts such as disassembled track rail links, grousers, bulldozer blades, end bits and fabricated members can be resurfaced easily. This attachment is operated by a gear which is mounted in the chuck.

These tractor rollers and an idler were rebuilt at a speed of 30 in. per min. by UNIONMELT *welding.*

With both machines, the wheels can be tilted for rebuilding the flanges. It takes only 80 to 90 minutes to rebuild a D-8 track roller. Idlers take about three times as long.

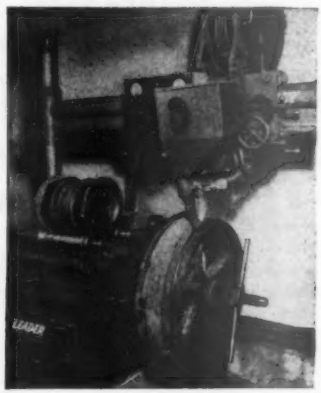
OXWELD 1928 rod is normally used in making these repairs. When wear is excessive, OXWELD 296 rod is sometimes used for the initial buildup which is then finished with OXWELD 1928 rod. For such resurfacing, use either Grade 80 or Grade 90 UNIONMELT welding compositions.

For some services, a finishing pass with a higher alloy tube rod is applied to produce a harder surface. While material of almost any hardness can be applied, one combining hardness and toughness lasts longer than one of higher hardness that tends to spall and chip. As deposited, OXWELD 1928 material has a hardness of about Rockwell C-25, but in service the working surfaces actually develop properties which cause them to outwear deposits that are substantially harder.

Advantages of UNIONMELT Build-up

UNIONMELT welded resurfacing is especially attractive with these automatic machines which readily permit deposit rates of 20 lbs. per hour. Savings in time and the advantages of a smooth uniform deposit justify the initial investment in automatic equipment. Important in these times is the conservation of metal realized with the process. The use of approximately *one hundred pounds of weld metal saves replacement of 2,000 to 3,000 pounds of new parts.*

LINDE's engineers and technicians will be glad to give further information about UNIONMELT welding. Telephone or write today.



UNIONMELT *welding head on "Leader" fixture rebuilds rollers and idlers. Rollers are welded on top of the machine, idlers at the side, and flat parts, depending on their size, can be welded on top of the machine or in the flat work attachment.*

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto

The terms "Linde," "Oxweld," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

THE IMPROVED

Exide-Ironclad

BATTERY

GIVES you more...SAVES you more

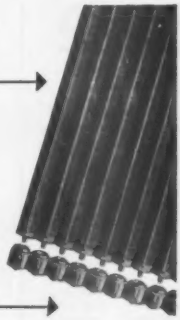
It gives you more of everything that adds up to top performance, long battery life . . . saves you more through low over-all costs. Outstanding new features, including the polyethylene insulating tube sealer, *more than ever before*, make Exide-Ironclad YOUR BEST POWER BUY . . . AT ANY PRICE.

HERE'S WHAT YOU GET

Rapid, accurate handling . . .
Uniform rate of handling . . .
High availability . . . Low operating costs . . .
Low maintenance costs . . . Low depreciation costs . . .
High maneuverability . . . Safe handling

AND HERE'S WHY

IMPROVED POSITIVE PLATE CONSTRUCTION. The long-life grids now contain SILVIUM—an alloy of silver, lead and other components —which make them highly corrosion-resistant.



NEW POLYETHYLENE INSULATING TUBE SEALER of acid-proof, non-corroding plastic. It fits snugly into slotted tubes of positive plates, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.

PLUS THESE EXTRAS

IMPROVED NEGATIVE PLATES for higher electrical efficiency.

NEW SEALING COMPOUND provides permanent seal between jar and cover.

SEAMLESS SHOCK-PROOF JAR, of high quality rubber, combines tensile strength and elongation for long-life and heavy-duty service.

NEW UNBREAKABLE PLASTIC VENT PLUGS of polyethylene.

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THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
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1888
DEPENDABLE BATTERIES FOR 64 YEARS
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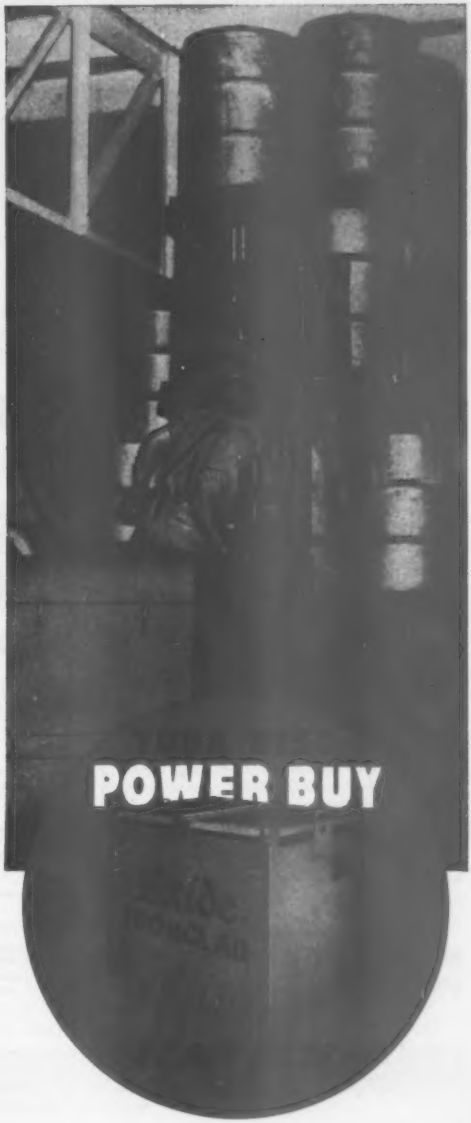
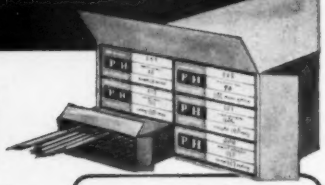
"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U.S. Pat. Off.*



THE P&H MAINTENANCE PACK PUTS THE RIGHT ROD FOR THE JOB AT YOUR FINGERTIPS!

Handy, small-package assortment of electrodes for repair and maintenance welding



NEW P&H Maintenance Pack

You no longer have to buy seldom-used rods in quantities larger than you need. For now, with the new P&H Maintenance Pack, you can keep some of each type on hand economically — and get replacement packages as you need them.

There are five different kinds of electrodes included in the P&H Maintenance Pack. It equips you to do all kinds of repair and maintenance jobs — and get fast, easy, sound welds. All rods are packaged to stay dry — and are clearly identified to make proper selection easy.

Be ready to meet every emergency. Save time, trouble, and money. Order a P&H Maintenance Pack from your P&H representative or local distributor. Mail coupon for name of one nearest you, and for further information.

$13.50

for complete assortment of five different kinds of electrodes (Approximately 27 lbs.)

1. AC-3, 1/8", 5/32", 3/16" — For all position welding of mild steels and sheet metal. AC or DC.
2. AC-1, 5/32" — For mild steels. AC or DC.
3. 70LA2, 5/32" — For high-carbon, alloy, high-sulfur, free-machining, cold-rolled, and other hard-to-weld steels. Ideal for steel casting repairs. AC or DC.
4. Harstain, 1/8" — For spring steels and stainless steels of all kinds. AC or DC.
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Send me further information on new P&H Maintenance Pack and name of my nearest dealer.

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INDUSTRIAL FILMS NOW AVAILABLE

"GROUP REPLACEMENT OF FLUORESCENT LAMPS" shows how you can junk your fluorescent lamps at 80% of life and save $120 per 1000 lamps. (See FACTORY, July 1951, page 112.) The film points out added benefits of group replacement, too. Runs 20 minutes. For free loan, contact:

Advertising & Sales Promotion Dept., Westinghouse Electric Corp., Bloomfield, N. J.

"MEEHANITE CASTINGS SERVE ALL INDUSTRY" is a 30-min. sound slide-film on the use of high-property iron castings. Illustrates applications in many industries. Available for free loan. Write:

Meehanite Metal Corp., New Rochelle, N. Y.

"ACCENT ON ACCURACY" describes the design developments, manufacturing techniques, and quality control procedures that go into making watthour meters. Animated sequences describe meter operation and maintenance. Write:

Your nearest General Electric Co. district apparatus office.

"WALLS WITHOUT WELDS" brings before you the manufacture of seamless steel pipe and tubing. Step by step the film covers the process from the iron ore to several types of customer's finished pipe. 16mm., 27 minutes, sound, color. Write:

United States Steel Corp., Film Distribution Center, 71 Broadway, New York 6.

"CELITE" is a 36-min. sound-color film that gives plant applications for a diatomaceous silica filter aid. Demonstrates how it can improve products and processes. Available free from:

Johns-Manville, 22 E. 40th St., New York 16.

Turn the page

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Toughened to "TAKE IT"

EBCo-built *U.S.S. Perch* in maneuvers off Alaska. Official U.S. Navy photo.

Industry has learned what marine engineers have known since 1880

ELECTRO DYNAMIC builds great motors

To withstand the terrific strains of submarine service, Electro Dynamic motors have long featured *extra-dependable* performance and *extra-rugged* construction to resist stress and prevent twisting and distortion.

E. D. motors for industry, like their famous marine counterparts, are built to stand up under the hardest kinds of uses. Their husky cast frames and housings assure rigidity and resist corrosion. And the special care and superior insulating materials that go into the WINDINGS . . . "the heart of the motor" . . . provide many extra years of dependable, low-cost operation.

There's an E. D. motor for every industrial application. Available in all standard enclosures...1 to 250 h.p. Write today for literature.

E. D. also makes a complete line of Direct Current Motors and Generators. Literature on request.

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AUTHORIZED SERVICE IN PRINCIPAL CITIES

Here's one that "rules out" mistakes!

NEW STANLEY "100 PLUS" FOLDING RULE No. X226

This new Stanley Rule not only saves time and effort in taking measurements, but also due to its construction, does away with chances of costly errors commonly made with ordinary rules.

Read it four ways:

1 Direct reading at one point for inside measurements using slide.
2 Reading as an ordinary extension rule for inside measurements.
3 & 4 Reading from either end as regular folding rule.

Plus Marking Gauge Features! True square ends, and "even" inch sticks permit use as a marking gauge for measurements in 2" and 4" multiples, and end-to-end measurements in 6" multiples as each stick opens.

Call Your Distributor!

No. 346W 6-ft. "Pull-Push" Rule
— Blade rigid for measuring straight, flexible for circular surfaces. Easy-to-read, black on white, replaceable blade.

No. 106 "Zig-Zag" Rule
— Popular folding rule with all the quality features that carpenters like.

Look for the "Green Ends"

—your assurance of finest quality

Stanley Tools, New Britain, Conn.

THE TOOL BOX OF THE WORLD

STANLEY

Reg. U.S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

INDUSTRIAL FILMS NOW AVAILABLE

Begins on page 350

"YOU BET YOUR LIFE" tells the part played by respiratory protective devices in fighting fires. Shows how to prevent harmful effects of smoke, gases, and vapors, and explains how to put on and use the various types of gas masks and breathing appliances. The 16mm. sound film runs 25 minutes. Available free from:

Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh, 8, Pa.

"NEMA MOVIE GUIDE" is a 56-page catalog that lists 409 16mm. electrical films. Each is selected by NEMA for its educational value. Films are fully indexed and described, and there's information on availability and cost. For your free copy, write:

Mr. C. A. Wihtol, National Electrical Mfrs. Assn., 155 E. 44th St., New York 17.

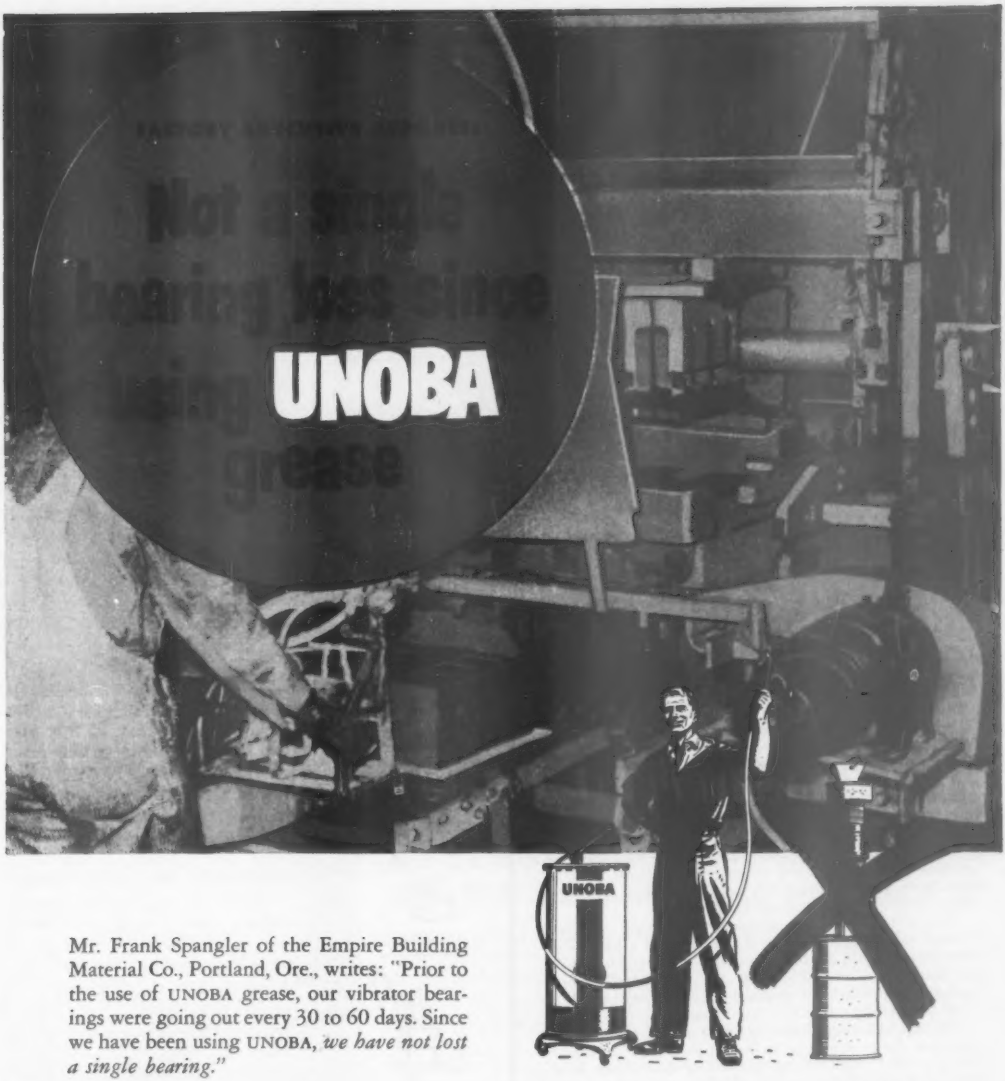
"FILM GUIDE ON INDUSTRIAL RELATIONS" gives details on 339 industrial films and sound slidefilms selected from 77 sources. Films are classified under: general human relations, supervisory training, leadership development, employee relations, selection and placement, health and safety, communications, labor organizations, public and community relations. Cost $3. Write:

Film Research Associates, 150 E. 52nd St., New York 22.

A FILM DIRECTORY you can use to plan supervisory training programs is available from National Association of Foremen. It lists more than 300 films of interest to foremen. Contains descriptions and information on sources and availability. Get copies from:

Natl. Assn. of Foremen, 321 W. First St., Dayton 2, Ohio.

Turn the page



Mr. Frank Spangler of the Empire Building Material Co., Portland, Ore., writes: "Prior to the use of UNOBA grease, our vibrator bearings were going out every 30 to 60 days. Since we have been using UNOBA, *we have not lost a single bearing.*"

UNOBA is the industry's original *multi-purpose* grease—one grease that does the work of many. Boiling water can't cut it . . . 300° F. will not change its smooth, buttery texture . . . and UNOBA will not turn brittle in cold weather.

Because of its versatility, UNOBA can be used in most of the grease cup and gun fittings throughout your entire plant—as well as in trucks and cars. In some factories, this *one* multi-purpose grease has replaced as many as *seven* specialized lubricants.

Your nearest Union Oil Company office will furnish full information and arrange for the delivery of a trial supply of UNOBA. Write today!

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LOS ANGELES, Union Oil Building · NEW YORK, 4904 RCA Building · CHICAGO, 1612 Bankers Building · CINCINNATI, 2111 Carew Tower Building

NEW ORLEANS, 917 National Bank of Commerce Building

UNION OIL COMPANY OF CALIFORNIA

76

with **THE MULTI-CLEAN METHOD!"**

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

MULTI-CLEAN®
PRODUCTS INC

free! FLOOR MANUALS
Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
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Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.
☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ All-Purpose Scrubber ☐ Wet-Dry Vacuum
Name and Title
Company
Address
City Zone State

FILM PROGRAM OF THE MONTH

Begins on page 350

INTERVIEWING

Here's a list of films on interviewing, selection, and placement (see page 124). You can use it as part of your training program to help plant executives who hire even though they're not professional personnel people. Each film is selected to supplement the information in the article.

"PLACING THE RIGHT MAN ON THE JOB" shows why you have to fit the worker to the job. It illustrates with the story of several employees who are misfits on one job and become top producers on another. 13 minutes, sound. For rent: $2; for sale: $23.60. Write:

Princeton Film Center, Princeton, N. J.

"INTERVIEWING" is a 20-min. film that gives some helpful pointers on how to conduct an interview and how to handle various interviewing situations. Free loan:

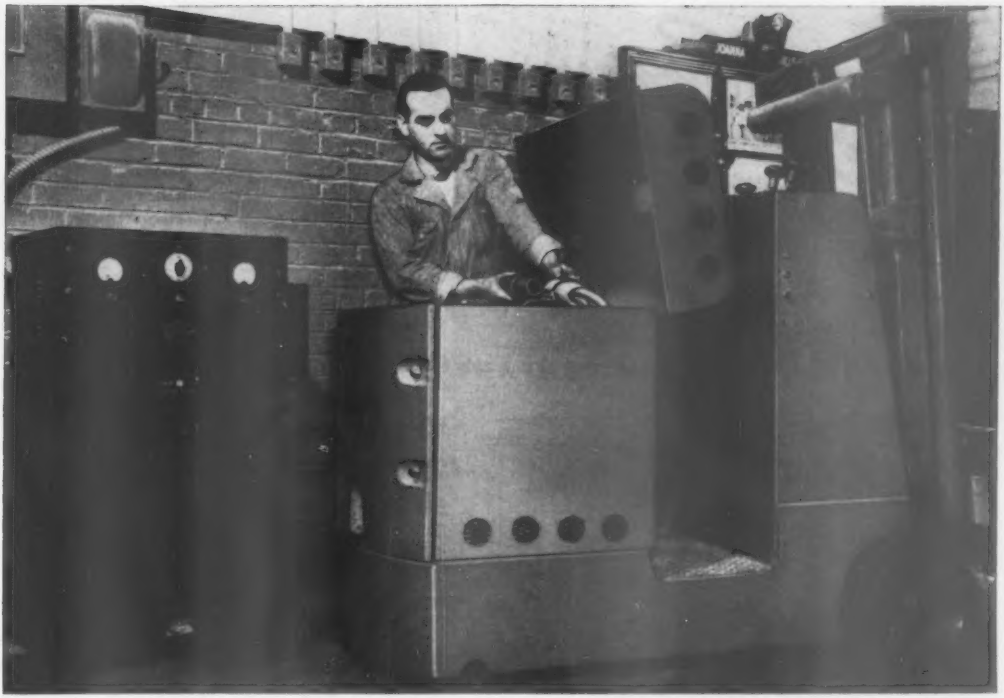
Federal Security Agency, Bureau of Old Age and Survivors' Insurance, Baltimore, Md.

"APTITUDES AND OCCUPATIONS" outlines six of the fundamental human abilities and tells how to find out how much of each ability your prospective employee has. Also explains the fields in which certain combinations of abilities are needed. 16 minutes, sound. For sale: $60. Write:

Coronet Films, 58 E. South Water St., Chicago 1.

"COUNSELING — ITS TOOLS AND TECHNIQUES" indicates what methods to use in counseling and how to get the most out of them. Covers interviewing, tests, questionnaires, films, and other techniques. 22 minutes. For rent: black and white: $5; color $10. For sale: black and white: $110; color: $220. Write:

Carl F. Mahnke Productions, 215 E. Third St., Des Moines, Ia.



CONVENIENTLY LOCATED OFF A MAIN AISLE AT JOANNA MILLS, THIS G-E METALLIC RECTIFIER IS USED FOR "ON-THE-SPOT" CHARGING

"Metallic rectifier chargers keep trucks rolling"

EASY CHARGING OPERATION is demonstrated by Joanna Mills' operator J. E. Stroud. He merely connects terminals (top photo), sets time switch (lower photo). Charging is automatic.

Joanna Mills Reports Dependable Operation with Minimum Maintenance of G-E Charger

Joanna Mills, Joanna, South Carolina, makes materials for drapes and window shades. They use a number of battery-operated lift trucks for materials handling.

"We've used G-E metallic rectifier chargers since 1946 to keep our lift trucks in top running condition," says Carl Franzen, Master Mechanic, "and very little maintenance has been needed."

EASY TO INSTALL

"One thing we like in particular," continues Mr. Franzen, "is the convenience of a G-E metallic rectifier. It doesn't take up much room, is easy to install in any convenient location, and needs no special foundation."

ECONOMICAL—AUTOMATIC

In addition to low installation costs, G-E metallic rectifiers have high efficiency, keep power costs down. Fully automatic, they have safety features which prevent damage to battery or charger in case of power failure.

For more information, ask your truck agent, or write for bulletin GEA-5292A, *Section 463-7, General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

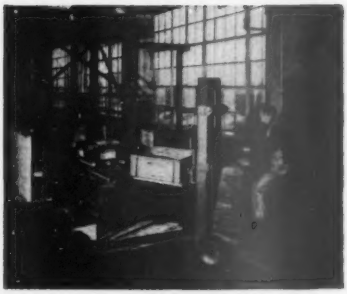
only through *Engineering*

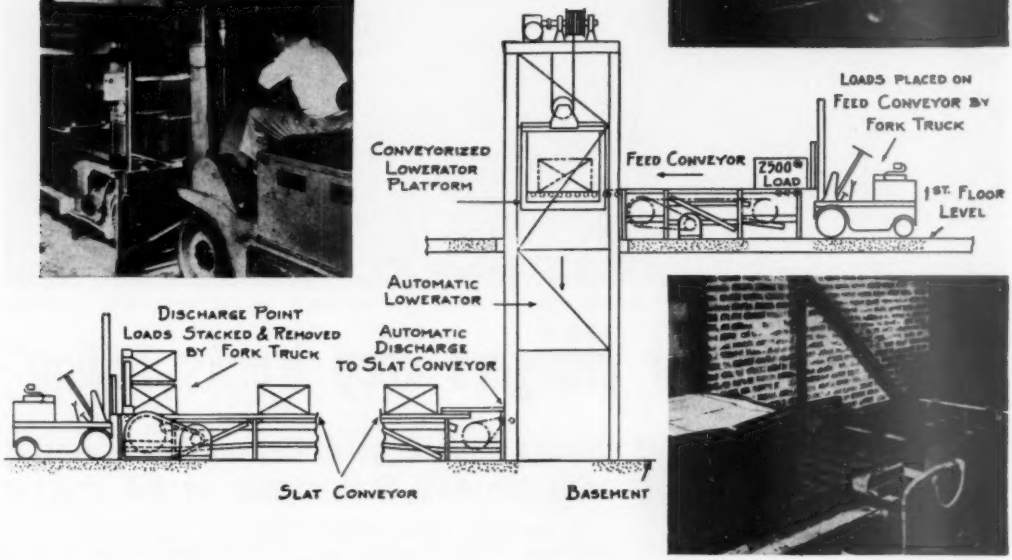
can *Efficiency* be achieved...

up 87½%

for department of a

LARGE EASTERN CAN COMPANY*





Like many foresighted manufacturing companies of today, this large eastern can manufacturing company, is constantly aware of in-plant materials handling as a major operating cost. The diagram and pictures present Gifford-Wood's solution to their problem of handling materials to storage. Long, empty return runs of the fork trucks used was only one aspect of the previous method of operation which was unduly expensive. Through the new G-W System, 2500-lb. bundles of steel sheets which formerly required eight hours to unload and store are now handled in one!

Working with Wigton-Abbott Corporation, Consulting Engineers, Gifford-Wood applied the materials handling knowledge for the solution of a costly problem—and this is only typical of many such engineered installations. All elements of such an installation (length of horizontal conveyor travel, raising or lowering to floors above or below, etc.) are, of course, designed to best suit the particular conditions encountered.

The G-W Materials Handling Engineer in your area will be glad to discuss the most economical means of materials flow in your plant. Call on him—it may well be the first step toward higher profits through lower operating and maintenance costs.

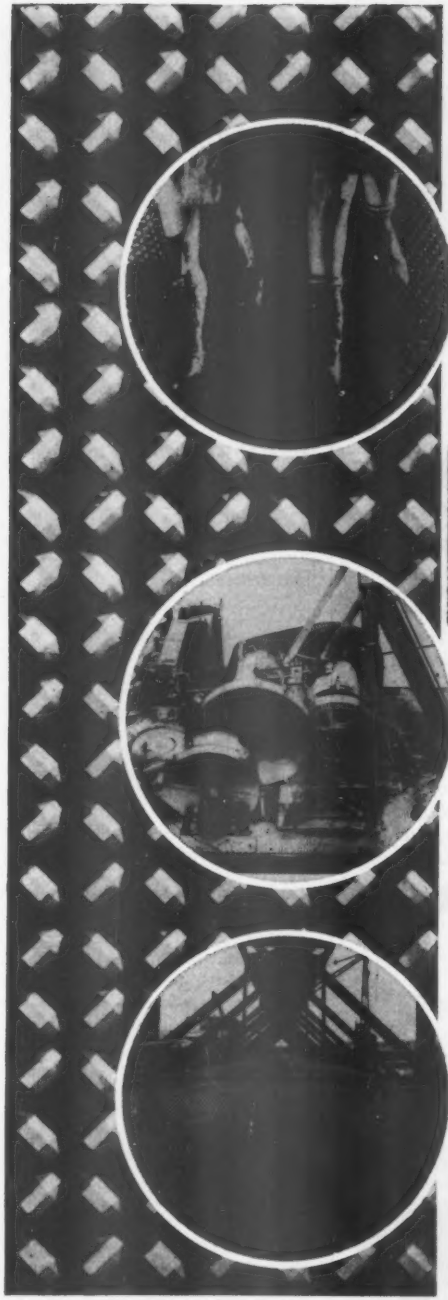
**Company name available on request.*

GIFFORD-WOOD CO.

Since 1814 • Hudson, New York

NEW YORK 17, N. Y. 420 LEXINGTON AVE. | ST. LOUIS 1, MO. RAILWAY EXCHANGE BLDG. | CHICAGO 6, ILL. 565 W. WASHINGTON ST.

When you think of materials handling—Think of Gifford-Wood



Though rain pours down on Multigrip
The plate will quickly drain,
And workers—safe from fall or slip—
Keep singing in the rain!

There's traction, too, on Multigrip
For each vehicle wheel.
And Multigrip will last for years . . .
(It's made by U.S. Steel!)

U·S·S MULTIGRIP Floor Plate provides sure footing . . . be it wet or dry. It is so designed that several skid-resisting risers at right angles to one another are constantly in contact with the foot . . . no matter from what direction the plate is approached.

Multigrip has no pockets that will hold water, grease and dirt . . . it drains freely in all directions. There are no gutters to trap a narrow wheel . . . vehicles roll *on* the risers, not *between* them. And the edges of the risers have gently sloping sides . . . there is nothing to catch the toe of a shoe on. It's *safe* . . . under all conditions.

UNITED STATES STEEL COMPANY, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S
multigrip
FLOOR PLATE

Sold by leading distributors from coast to coast

2-1416

UNITED STATES STEEL

When servicing costs are high as the lights . . .

Lower Both Lights And Costs With Thompson Hangers!

You're losing money when you use two men and a lift truck to service lighting fixtures . . . *and you're risking someone's neck!* THOMPSON disconnecting and lowering **HANGERS** facilitate rapid, safe, efficient floor-level maintenance of high-bay lights.

You can assure maximum round-the-clock lighting efficiency by following a planned maintenance program. And remember . . . *there is no faster, safer or more economical means of servicing overhead lights than with THOMPSON HANGERS. Simple manual operation is exercised at floor level.*

Write today for new illustrated Bulletin TH52 for additional details.

654-TE

1. DISCONNECT 2. LOWER 3. SERVICE 4. REPOSITION 5. REPEAT

THE THOMPSON ELECTRIC CO.

1121 POWER AVENUE • CLEVELAND 14, OHIO

BEHIND THE BYLINE

Meet some of the men in industry who wrote articles for this issue of FACTORY.

GILBERT R. BOUTIN writes his second article on stores control (page 142). His first appeared last June, page 140. He's plant comptroller for Chase Brass & Copper Co., Inc., and is a certified public accountant.

M. C. HUDGINS began as an engineer with Ethyl Corp. 13 years ago, successively became maintenance supervisor, assistant superintendent of maintenance, and superintendent of maintenance, his present position. He describes maintenance planning and scheduling on page 92.

JAMES E. ALLEN is coordinator of the work simplification program at Birtman Electric Co. (page 101). He's been with the company for 11 years, has spent five of them in time and motion study.

Turn the page

What do you do when you don't have the right size v-belt in stock?

1

Contact your supplier for a replacement

...and wait for delivery

...wait—and watch production stay at zero

2

Send someone to get the required belt

...and pay your employee while he goes for the belt

...pay through loss of production

3

Stock VEELOS...

...and always have the *right size* belt when you need it

...any length can be made up from a 100-foot reel

...inventory is automatically maintained

...available from 350 distributors

GET ALL THE FACTS

This Veelos Data Book gives complete details about construction, installation and uses. Write for free copy of this money-saving book today.

MANHEIM MANUFACTURING & BELTING COMPANY
604 Manheim St., Manheim, Pa.

VEELOS in stock is Production Insurance

Belts for replacement always on hand—just 4 reels of Veelos in the 0, A, B and C widths can replace up to 316 different sizes of endless v-belts.

Link construction permits quick installation—without removing outboard bearings.

Adjustability provides controlled tension on each belt—vibrationless, full power delivery is assured.

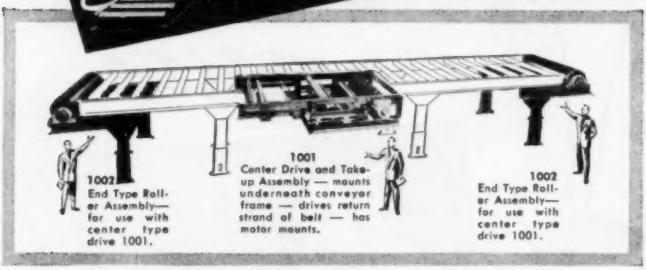
VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH · ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also double V in 0, A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

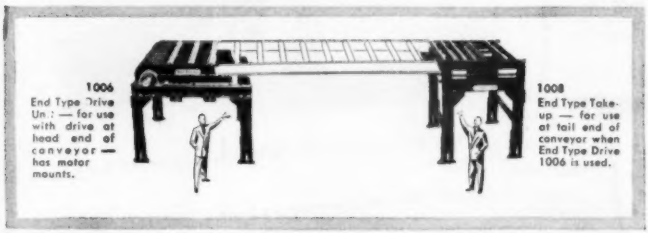
Now...ENGINEER AND ASSEMBLE YOUR OWN CONVEYOR WITH

Standard HANDIDRIVE 1000 SERIES PRE-BUILT POWER CONVEYOR UNITS


1002
End Type Roller Assembly—for use with center type drive 1001.
1001
Center Drive and Takeup Assembly — mounts underneath conveyor frame — drives return strand of belt — has motor mounts.
1002
End Type Roller Assembly—for use with center type drive 1001.

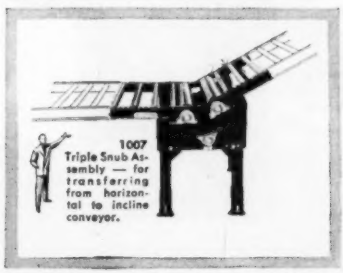
HANDIDRIVE 1001-1002 PRE-BUILT CONVEYOR UNITS

This Center Drive and Takeup Assembly drives return strand of belt—mounts underneath conveyor frame — can be used to convert present gravity conveyors to live, or powered, belt or roller conveyor or to make additions or changes to existing power conveyors. Unit 1002 is End Type Roller Assembly for use with 1001 Center Drive Assembly.


1006
End Type Drive Unit — for use with drive at head end of conveyor — has motor mounts.
1008
End Type Takeup — for use at tail end of conveyor when End Type Drive 1006 is used.

HANDIDRIVE 1006-1008 PRE-BUILT CONVEYOR UNITS

1006 is an End Type Drive Unit for use with drive at head end of conveyor. 1008 is an End Type Take-up for use at tail end of conveyor when End Type Drive 1006 is used. These two stock units make it an easy and simple matter to put together a complete power conveyor line.



HANDIDRIVE 1007 PRE-BUILT CONVEYOR UNIT

This is a Triple Snub Assembly Unit for placing in a conveyor line for transferring flow of commodities from horizontal to incline. Another of Standard's stock units that provide flexibility of planning and arrangement in making your own custom-built conveyors.

Send today for HANDIDRIVE 1000 Series and complete information. Conveyor engineering service is offered without obligation. Series "400" and "700" units also available for lighter load applications. Write Dept. FM-10-52.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul 9, Minnesota
Sales and Service in Principal Cities

Send for special bulletin HANDIDRIVE 1000 Series and Bulletin 638 describing Standard Gravity and Power Conveyor Units.

BEHIND THE BYLINE

Begins on page 358

CHESTER I. BABCOCK, a chemical engineer specializing in fire prevention and control, joined National Fire Protection Assn. in 1946. He's the author of several texts, and is an asosciate member of the Society of Fire Protection Engineers. (Page 126).

ROBERT GALLOWAY has had experience in many phases of plant operation. He's now with Wallace Clark Co., management consultants, as senior staff engineer specializing in plant layout, production and maintenance planning. Tells how to get more out of air tools (page 113).

HERBERT L. MATTHEWS, who writes about the not-so-good old days (page 276), is a veteran reporter, foreign editor, and war correspondent. He's been with the New York Times for 30 years, and is now on the editorial staff in New York.

Turn the page

Fluorescent Service Co. finds CERTIFIED BALLASTS best

WILLIAM H. STERN, *President*
Fluorescent Service Company

Fluorescent Service Company, outstanding Washington, D. C., firm specializing in maintenance of fluorescent lighting installations, reports CERTIFIED BALLASTS give the best lighting results.

Mr. William H. Stern, president, says, "I find far fewer ballast troubles and better lighting performance when Certified Ballasts are used and I consider it good practice to install Certified Ballasts whenever replacements are necessary."

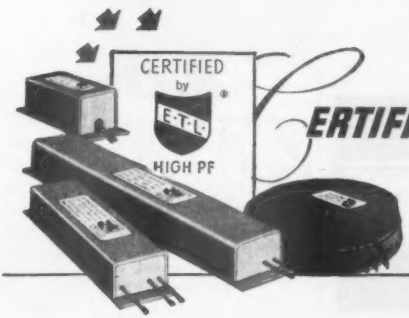
Experience is proving it pays to insist on CERTIFIED BALLASTS because they assure—

Full Lamp Life **Rated Light Output** **Long Ballast Life**

CERTIFIED BALLASTS are made by 10 leading manufacturers to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

Write for complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer.

Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

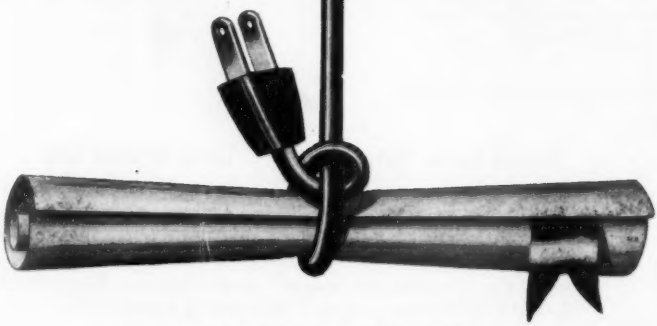
Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

If you make electrical equipment

Your Reputation hangs upon a Cord

Every electrical tool or appliance is only as good as its cord. Provide your products with a guarantee of long and useful service by equipping them with DYNAPRENE flexible cords. DYNAPRENE is jacketed with a special tire-tread neoprene compound that is the result of years of research and experience. DYNAPRENE is the tougher cord that has tremendous resistance to abrasion as well as all the other good qualities you get in neoprene. DYNAPRENE is more flexible and stands up under hard usage.



Be sure to specify Whitney Blake type SO, SJO and SV-type neoprene jacket for your flexible cord requirements.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE CO.

NEW HAVEN 14, CONNECTICUT

BEHIND THE BYLINE

Begins on page 358

A. A. TUMSER divided his 47-year career between automobile and aircraft manufacturers. During World War II he was director of quality control for Wright Aeronautical Corp. Last year he joined Bridgeport-Lycoming, Div. Avco Mfg. Corp. in the same capacity. He writes about tool-and-gage control on page 110.

HARRY MILTON BALDWIN, co-author with A. A. Tumser (page 113) spent seven years in naval aviation, then went on to work the next 20 years for large aircraft manufacturers. He's now general foreman, quality control, for Bridgeport-Lycoming.

HOWARD MARKS came to Whirlpool Corp. in 1945. Two years later he was promoted to plant superintendent and last spring he became general superintendent, St. Joseph plants. He tells about a "bunching" conveyor (page 118).

FOR CLASSY SHOPS

. . . OR BUSY PLANTS

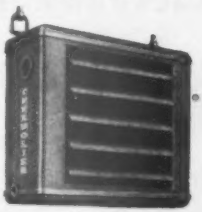
THERMOLIER UNIT HEATERS

The condensed table below is a quick guide to the selection of the correct Thermolier for specific conditions. The capacities, when motors are operating at normal speeds, are based on Standard Basis of Rating: 2 lb. steam pressure and 60° F entering air temperature.

Grinnell Thermoliers are tested and they are rated in strict accordance with rules of the Industrial Unit Heaters Association.

All Thermoliers can be operated at working steam pressures up to 125 psi and steam temp. up to 406° F.

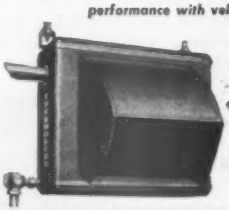
A MODEL AND SIZE FOR EVERY PURPOSE



horizontal delivery

textile (horizontal delivery)

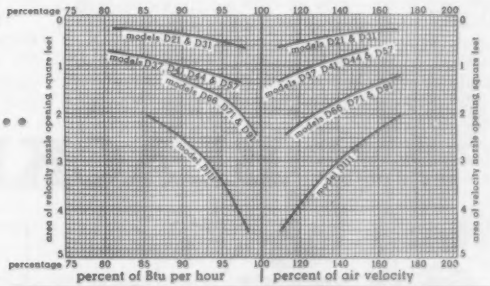
vertical delivery



velocity nozzle (horizontal delivery)

model	total heat delivered, Btu per hr	sq ft edr (nominal)	air velocity at exit, louvers open, lin. ft. per min.
horizontal delivery			
D21	35,600	148	786
D31	48,700	203	851
D37	62,200	259	753
D41	71,000	295	901
D44	84,100	350	887
D57	101,300	422	1016
D66	128,700	536	779
D71	151,700	632	977
D91	196,000	817	985
D111	275,300	1147	1048
Textile			
TX70	69,800	291	826
TX110	113,700	474	877
vertical delivery			
VA1042	50,800	212	1399
VA1045	73,600	307	1287
VA1065	109,400	456	1354
VA1075	145,600	607	1231
VA1101	185,000	770	1495
VA1111	257,000	1071	1631

performance with velocity nozzle ▶


percentage 75 80 85 90 95 100 120 140 160 180 200
models D21 & D31
models D37, D41, D44 & D57
models D66, D71 & D91
models D91 & D111
models D37, D41, D44 & D57
models D66, D71 & D91
model D111
model D111
area of velocity nozzle opening, square feet
percent of Btu per hour
percent of air velocity

GRINNELL
THERMOLIER UNIT HEATERS

CALL YOUR LOCAL GRINNELL DISTRIBUTOR

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

Blackhawk Hydraulic Equipment

saves thousands of dollars

aligning jet engine saddles!

1001 similar ideas make the new BLACKHAWK IDEA BOOK a "gold mine" for you

One pump—a Blackhawk P-182 — powers all 13 Blackhawk Rams on Bell Aircraft aligner. Blackhawk Valves are also used throughout.

HERE'S what happens when idea men of industry and versatile Blackhawk hydraulic equipment team up. At Bell Aircraft, production of jet engine nacelles was slowed by a bottleneck in aligning saddles as they came from welding.

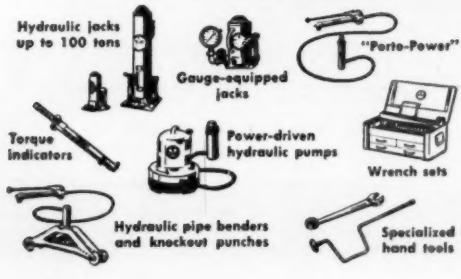
But not for long! Idea men of Bell's production engineering department—working with Blackhawk field engineers—came up with a straightener built of standard Blackhawk hydraulic components that turns out several times as much work as the former method . . . with less manpower! In the first three weeks, it saved Bell Aircraft thousands of dollars!

It's the same story in plant after plant. You see, many industrial and construction methods are today being revolutionized by Blackhawk equipment. Savings in time, money and materials are often spectacular. Safety and ease are being introduced to many jobs formerly downright dangerous and back-breaking. Yet Blackhawk equipment itself is surprisingly low in cost!

You, too, can be an Idea Man! Get your copy of the great new BLACKHAWK IDEA BOOK today. It's loaded to the margins with new uses for hydraulic tools and hand tools . . . shortcuts you'll find nowhere else.

Headquarters for the world's most complete line of hydraulic tools plus industrial hand tools.

BLACKHAWK



How to get your FREE copy of the IDEA BOOK

Ask for it from "The Man Who Knows" — your nearby Industrial Supply Distributor who represents Blackhawk. He'll be glad to give you an IDEA BOOK plus full facts on his Blackhawk products. If your distributor cannot supply the IDEA BOOK, write on your company letterhead to Blackhawk Mfg. Co., Dept. M-27102, Milwaukee 1, Wisconsin.

In the critical Cigar Conditioning Room of D. W. G. Cigar Corporation, Lima, O. **(home of such famous cigars as R. G. DUN, EL VERSO, and SAN FELICE)**, walls are ¼" "Century" APAC. This asbestos-cement structural board is also used in the Cigar Machine Room and Tobacco Conditioning Tunnel.

"These walls of 'Century' APAC are an added safeguard where temperature and humidity must be accurately controlled,"

says J. P. Weller, Master Mechanic—

No nurse in an infants' ward ever guarded her charges more jealously than D. W. G. Cigar Corporation watches over the thousands of quality cigars they turn out every day.

So when J. P. Weller, D. W. G.'s Master Mechanic, chooses "Century" APAC for the walls of the important Cigar Conditioning Room, you can take his word that APAC is an ideal material where temperature and humidity are accurately controlled.

And because APAC is made of mineral asbestos and portland cement, you know fire can't burn it . . . water can't soak it and termites can't eat it.

You'll find this asbestos-cement structural board gives you as low a first cost and maintenance expense (*never* needs painting!) as any comparable material you can use for interior or exterior walls . . . ceilings . . . partitions . . . and linings.

It goes on fast, too—big sheets (standard 4′ x 8′) can be cut or drilled and fastened easily with screws or ring-fettered nails. Write us for details about "Century" APAC . . . and name of your nearest distributor.

Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873.

KEASBEY & MATTISON

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Fire can't hide from this "NOSE"

A slow burning fire in your storage spaces, electrical equipment, record vaults, etc., can cause plenty of damage. But not if this "Nose" is on the job!

Let the tiniest, slowest-burning fire just *try* to escape attention. The slightest whiff of smoke is collected by this "Accumulator" and sent to the central control panel of the Kidde Industrial Smoke Detector. Instantly, a warning is transmitted to your fire control headquarters or to the local fire department.

The Kidde Industrial Smoke Detector spots smoldering blazes fast, long before there is enough heat to set off automatic heat-actuated extinguishing or alarm devices.

Write today for full information on Kidde fire detectors, CO_2 and foam systems, as well as portable extinguishers.

Kidde

Walter Kidde & Company, Inc., 1032 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Only lighting units that can meet or exceed approved standards of quality bear this

RLM LABEL

...and here are these STANDARD SPECIFICATIONS in the up-to-date, enlarged edition of the

NEW RLM SPECIFICATIONS BOOK

This new, greatly-enlarged RLM Specifications Book contains complete RLM Specification data on a total of 68 types and sizes of fluorescent, incandescent and mercury industrial lighting units. One or more of these units—conforming to RLM quality specifications and certified to bear the RLM Label—is offered by each of 26 manufacturers.

The RLM Label affixed to a lighting unit is a Certificate of Assurance. It assures the buyer that the equipment meets or exceeds certain quality standards established by the RLM Standards Institute and published in its 48-page Specifications Book. Further, it provides a Warranty of Uniform Quality . . . a guarantee that every RLM-Labeled Unit off each manufacturer's assembly line will conform constantly and continuously—will never waver below these standards.

You can rely on this Warranty. It is upheld by the extensive RLM Inspection and Certification Program—the real backbone of the RLM Label. As fully explained in the RLM Specifications Book, periodic inspections are made by an independent testing laboratory. Lighting units are checked for conformance to RLM standards as they come off assembly lines, as well as at all levels of distribution.

Send for your COMPLIMENTARY COPY of the RLM Specifications Book. Long recognized as an authoritative aid to everyone who buys, sells, specifies or installs industrial lighting equipment, this enlarged 1952 edition includes coefficient of utilization tables and light distribution curves to make it even more helpful. It puts the whole story on the 68 different RLM Lighting Units right at your fingertips. Your copy of the new edition, RLM Specifications Book is available without cost or obligation. Address your request to: RLM STANDARDS INSTITUTE, Suite 1829, 326 W. Madison St., Chicago 6, Illinois.

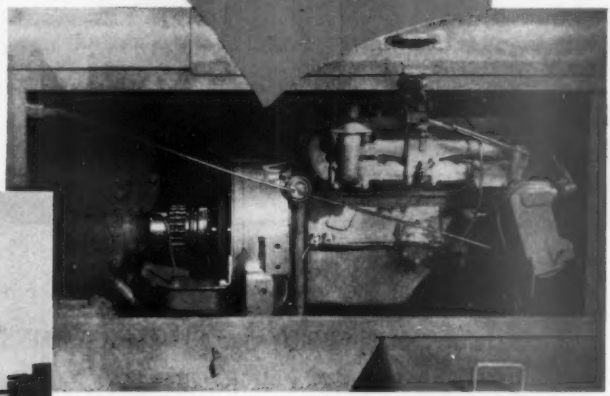
RLM STANDARDS INSTITUTE
INCORPORATED
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

Rm084

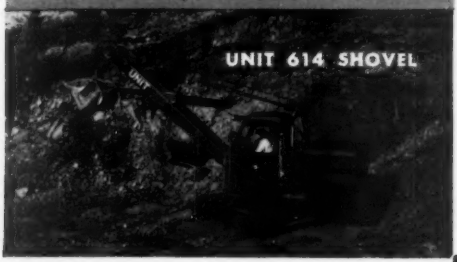
Announcing UNIT with FLUID TORQUE DRIVE

To a long line of improvements in design and construction, UNIT has added another advancement — FLUID TORQUE DRIVE. This torque converter application gives the operator a steady flow of power which he can regulate with smoothness and accuracy. Elimination of shock loads adds life to bearings, shafts, gears, and cables . . . brings maintenance costs down to a minimum. Excavating work is done with a strong steady flow of power, with no "stall" and no "delay" while the engine regains speed. Crane work can be done with greater smoothness of operation by throttle control.

UNIT offers the Chrysler Torque Converter as a standard installation at no extra cost on ½ yard machines equipped with 6 cylinder Chrysler Industrial Gasoline Engines.



SIX-O-THIRTY PERFORMANCE — Smoothness of operation is achieved in traveling as well as in lifting and digging. The Torque Converter in Mobile equipment allows for smooth break-away performance.



Time-saving, Cost-reducing Advantages

- Greater work output without increasing fuel consumption
- Eliminates "shock loads" on machinery, reducing maintenance cost
- Smoother and more accurate control of all operations
- Builds up line pull without excessive load on engine
- Full steady power for peak loads without stalling engine
- Quick engine pickup retains maximum line speeds
- Provides "regulated load handling" by throttle control
- Increases lugging power for hard excavating
- Engine clutch eliminated entirely
- Installation available at NO EXTRA COST

UNIT CRANE & SHOVEL CORP.
6602 W. Burnham St., Milwaukee 14, Wis., U.S.A.

Other UNIT machines are available in ½ and ¾ yard Excavators and Cranes up to 20 Tons . . . Crawler or Mobile Types . . . Gas or Diesel . . . Fully convertible to ALL attachments. Write for descriptive literature.

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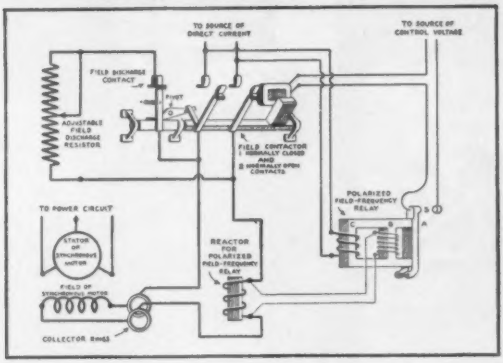
EC&M SYNCHRONOUS STARTERS

with Automatic Field Application by Polarized Field-Frequency Relay



Push Button Start **brings motor up to speed automatically. Motor pulls into step *without delay*. Automatic Field Removal if motor slows down on voltage dips or overload. Field automatically re-applied when load re-accelerates.**

★★★

With greater skill than human hands could do it, EC&M Push Button Magnetic Starters provide completely automatic operation of synchronous motors.

At about 95% synchronous speed, the motor is pulled into synchronism. Full Field excitation occurs when the rotor and stator poles are most favorable to locking into synchronism. This causes synchronization to occur without pole slippage, with minimum line current and greatest synchronizing torque.

EC&M Synchronous Starters are built for both low and high voltages up to 4600 volts. They are of unit construction with all internal wiring complete. The cubicle types are totally enclosed and do not require an expensive control room. They may be mounted alongside the motors they control.

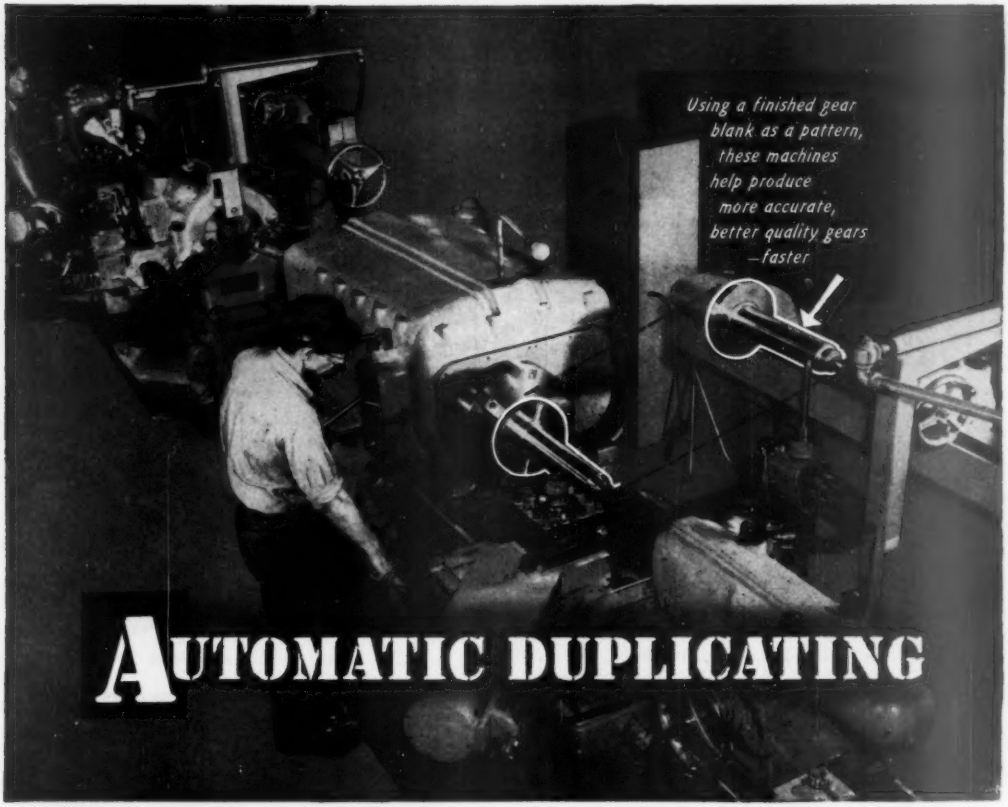
Write for No. 21 ACCELERATOR and Bulletins 1075, 1076, 1077 and 1078

440 Volt EC&M Enclosed Synchronous Starter

2300 Volt EC&M VALIMITOR Starter for Steel Mill Air Compressor

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO



AUTOMATIC DUPLICATING

AUTOMATIC DUPLICATING of gear blanks in our shops, illustrated above, is faster and more accurate. And it indicates the advancements in modern gear manufacturing.

- Today quality gear manufacturing requires new machines and techniques plus experience and skill acquired making every conceivable type of gear, assembly, reducer, and transmission over a long period of time.
- It is this combination which BRAD FOOTE offers you to help solve the problems you may have. From our creation of the original drawing of the gears or assemblies you need, through every step of manufacture in our own shops, a series of controls guarantees quality. No one shares our responsibility.
- Whether your requirements call for only one standard or specially engineered gear, gearmotor, reducer, or transmission—or an unlimited quantity—you'll find BRAD FOOTE service to your liking.

Your inquiries will receive prompt attention.

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
BIshop 2-1070 • OLympic 2-7700

subsidiaries

AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

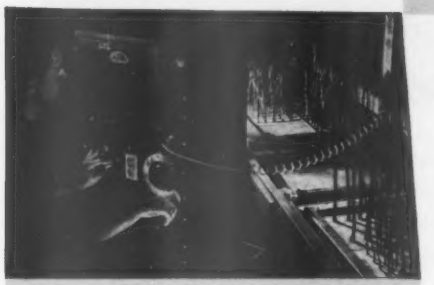
PITTSBURGH GEAR COMPANY
Phone: ATlantic 1-9950
Pittsburgh 22, Pennsylvania

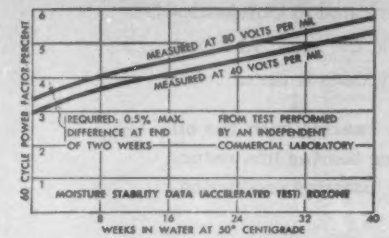
500,000 CM stranded single conductor RoZone insulated, RoPrene sheathed power cable . . . 5000 volts.

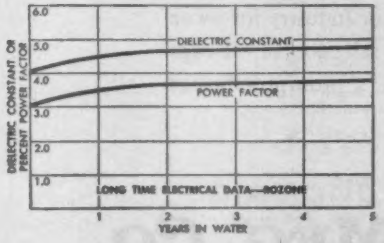
Rome RoZone®

Superior Ozone-Resistant Insulation Deserves Your CONFIDENCE

As indication of their behavior in service and conformity to specification, insulated cable specimens are measured electrically for moisture absorption after long-time immersion in temperature controlled water baths.




60 CYCLE POWER FACTOR PERCENT
MEASURED AT 80 VOLTS PER MIL
MEASURED AT 40 VOLTS PER MIL
REQUIRED: 0.5% MAX. DIFFERENCE AT END OF TWO WEEKS
FROM TEST PERFORMED BY AN INDEPENDENT COMMERCIAL LABORATORY
MOISTURE STABILITY DATA (ACCELERATED TEST) ROZONE
WEEKS IN WATER AT 50° CENTIGRADE



What Its Exceptional Moisture Resistance Means To You

Q: What effects can moisture have on cable insulation?

A: The presence of moisture absorbed in cable insulation alters its electrical character and, depending on the type of insulation, may effect those characteristics most important for service . . . causing failure.

Q: Can the effects of moisture be predetermined?

A: Yes . . . by long-time electrical measurements or by recently developed electrical stability tests. Since it is not only a question of "how much" moisture is present but, even more important, its location or distribution within the insulation, an electrical test is considered to be the only truthful yardstick of performance.

Q: Does RoZone resist moisture satisfactorily?

A: Yes. Experience and long-time test data have proved RoZone has exceptional *electrical stability in the* presence of water and its performance is not impaired by exposure to water.

Q: Where could cable insulation become appreciably exposed to water during service?

A: In submarine service, buried directly in the earth, or in wet ducts or conduit. Water is present almost everywhere and may condense in raceways or on cables suspended in air. RoZone is recommended for any of these applications.

It Costs Less to Buy the Best

RoZone is approved and accepted by leading utilities, industrials and consulting engineers.

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.

School Daze!

Just because that bathing suit is proper at the beach, she shouldn't assume it's proper for the classroom, too!

And just because one bearing is best lubricated by one particular grade of oil, you shouldn't assume that the same oil is best for *all* bearings on that machine. In many cases it isn't.

OIL CUPS permit you to lubricate each bearing with the oil best suited to that bearing—thus prolonging bearing life, reducing maintenance costs, cutting down-time, boosting production. And oil cups fortunately *cost very little.*

Gits oil cups have been the standard for industry for more than 40 years. Gits Bros. has the largest selection of oil cups available anywhere. Call on Gits Bros. for a prompt, efficient solution to your lubrication problems.

Write for free Catalog No. 60-A

GITS BROS. MFG. CO.

1831 S. Kilbourn Ave. • Chicago 23, Illinois

Why is there a difference in ROLLER CHAINS?

For the past sixty-two years the Diamond Chain Company has continuously devoted its efforts to the attainment of higher quality in the product, and the constant expansion in the use of roller chain as a superior mechanical means of power transfer. . . Research, testing and engineering developments have always been factors of first consideration at Diamond Chain.

FOR EXAMPLE:—

1. Diamond Chain has improved the pin and bushing holes in the link plates by proper pitch hole preparation. Pins and bushings are case hardened.
2. Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.
3. Diamond Roller Chain is constantly improved. Time tested improvements become standard for production as soon as established and certified.
4. Fully equipped and well staffed chemical and physical testing laboratories have made it possible to control raw material specification, their treatment and processing.
5. Diamond Chain has established production processing methods and quality controls through multiple inspection to insure uniformity of high quality in continuous production runs.
6. As always the Diamond trade-mark on roller chain is the Hall Mark of Quality.

DIAMOND CHAIN COMPANY, Inc.

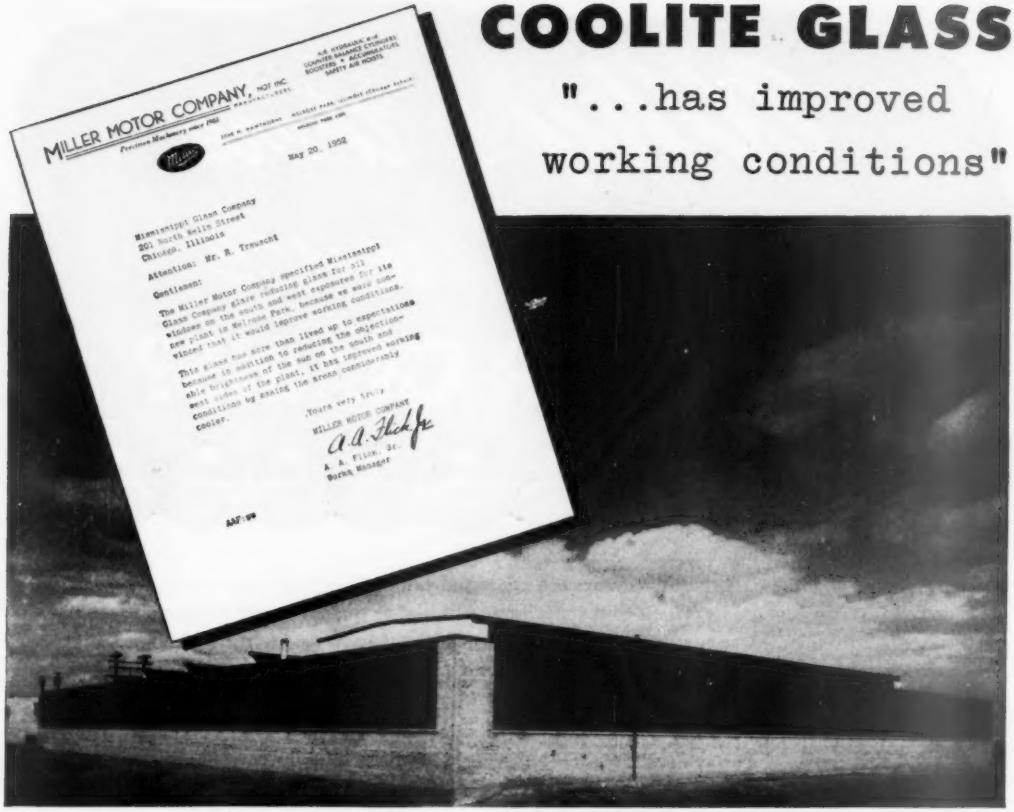
Dept. 449, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

COOLITE GLASS

"...has improved working conditions"


MILLER MOTOR COMPANY
May 20, 1952
Mississippi Glass Company
201 North Wells Street
Chicago, Illinois
Attention: Mr. R. Truscott
Gentlemen:
The Miller Motor Company specified Mississippi Glass Company glass including glass for all windows on the south and west exposures for its new plant in Melrose Park, because we were convinced that it would improve working conditions.
This glass has more than lived up to expectations because in addition to reducing the objectionable brightness of the sun on the south and west sides of the plant, it has improved working conditions by making the areas considerably cooler.
Yours very truly
MILLER MOTOR COMPANY
A. A. Fluck, Jr.
Works Manager
AAF:ms

Miller Motor Company, Melrose Park, Illinois. John S. Cromelin, Architect, Hamilton Glass Company, Glazier.

Manufacturer of Air and Hydraulic Equipment Selects COOLITE GLASS by Mississippi to Cut Raw Sun Glare and Heat

Modern management knows that workers who see better, produce better... and this testimonial from a user of Coolite, Heat Absorbing, Glare Reducing Glass by Mississippi highlights the importance of "visioneering" in a modern plant. Coolite traps and absorbs much of the sun's heat—helps keep interiors comfortably cool. Coolite also filters out annoying glare, floods work areas with pleasantly tinted, softened, filtered light that cuts costly eye fatique.

Conditioned, natural illumination helps reduce operating costs—and Coolite is easy to maintain, eliminates need for painting or makeshift blinds.

Specify Mississippi Glass to your architect, builder or contractor. Available in a wide variety of patterns and surface finishes, all scientifically designed to distribute light to best advantage.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

SEE HOW COOLITE CAN SAVE MONEY FOR YOU

If your are modernizing existing facilities or constructing new ones, include Coolite Glass in your plans. Its cool, blue-green color adds a modern note to any exterior. Coolite's filtered light can provide increased efficiency ond economy, boost employee morale and reduce rejects. See your Mississippi Glass distributor today.

Send for free Coolite Catalog, "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

WORLD'S LARGEST MANUFACTURER OF ROLLED FIGURED AND WIRED GLASS

For Handling a Number of Jobs . . .

Loading foundry sand into an elevator is just one of the tasks performed by this Allis-Chalmers HD-5G Tractor and Tracto-Shovel. It also breaks up and loads slag, removes snow, cleans out dust hoppers, handles coal, spots railroad cars, carries heavy castings from one department to another. Fourteen quick-change attachments multiply its usefulness, keep it busy the year-round.

For Saving Critical Production Time . . .

This HD-5G adds valuable days to the steel production time of 14 open-hearth furnaces. In cleaning out slag pits, it releases 13 laborers for other work, gets the job done in a fraction of the time. With trench hoe attachment, it tears out old lining brick to speed rebuilding of furnaces. Used also for loading wet loam, moving and placing machinery, excavating, other jobs.

For Heavy Lifting, Carrying, Excavating

Bucket is replaced by lift fork attachment in a few minutes' time, and the HD-5G easily handles lumber and other palletized loads in two-ton "bites." (Larger models have lifting capacities ranging up to 12,000 lb.) A-C crawlers have the stability for rough terrain — the power, weight and traction to work anywhere.

. . . choose an A-C Tractor with Tracto-Shovel Attachments

There's a size to fit your needs

	HD-5G	HD-9G	HD-15G	HD-20G
Horsepower	40 (drawbar)	72 (drawbar)	109 (drawbar)	175† (net engine)
Total Weight	16,200 lb.	29,900 lb.	44,400 lb.	61,600 lb.
Bucket Size	1 — 2 yd.	2 — 4 yd.	3 — 5 yd.	4 — 7 yd.
Dumping Height*	9 ft.	11 ft. 4 in.	12 ft. 8 in.	13 ft.

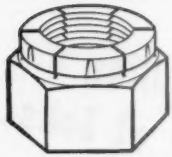
*Height of Bucket Hinge †Torque Converter Drive

Interchangeable Attachments

Include standard, light-materials and heavy-duty buckets — bulldozer blades — lift or rock forks — plus other attachments for some models.

ALLIS-CHALMERS

TRACTOR DIVISION · MILWAUKEE 1, U. S. A.



FLEXLOC Self-Locking Nut

Just what are these Flexloc nuts?

"They're nuts that lock and stay put on a bolt. Once you install them, you can forget them. They sure save a lot of time in maintenance. Let me show you just what I mean. This shuttle assembly is fastened together with FLEXLOC *Self-Locking Nuts. We haven't had to put a wrench on it since we installed it."*

When nuts work loose, you're in real trouble. Machinery is often damaged and stopped. Production suffers, deliveries lag, and you lose money. But there's a sure way to keep nuts where they belong. Specify and install FLEXLOC Self-Locking Nuts.

FLEXLOC locknuts have higher tensile strength than most other locknuts. They're not affected by temperatures to 550°F. And because their torque is controlled within such narrow limits, they have been used successfully on plastic studs.

Increased capacity now enables us to make quantity shipments of FLEXLOC locknuts in a wide range of sizes. Write for literature, and samples. STANDARD PRESSED STEEL Co., Jenkintown 11, Pa.

FLEXLOC LOCKNUT DIVISION

SPS

JENKINTOWN, PENNSYLVANIA

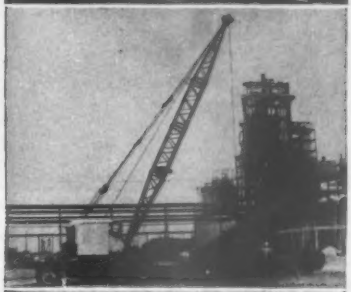
LOOK HOW YOU CAN DO MORE WITH A MOBILE LORAIN® CRANE

LOOK
PILE HIGHER

Long booms pile high — build storage areas "up" — save valuable yard area.

LOOK
REACH FARTHER

Long Lorain Crane booms reach far and wide over stockpiles. Fewer aisles are needed. Lorain's long reach has revamped many yard storage methods.



LOOK
HANDLE HEAVIER LOADS

Lorain Cranes will handle all your lifting problems. They are heavy-duty machines that won't let you down and will provide a choice of front ends and attachments to handle any type, size or shape of material. Capacities available up to 45 tons.

LOOK
MOVE FASTER — FARTHER

You can go anywhere with a rubber-tire Lorain. You're not "chained to tracks". Your Lorain can travel fast inside or outside the plant — and can carry loads suspended from the boom wherever you want them. Will switch cars or trailers.

LOOK
SAVE MANPOWER

One man at the controls of a Self-Propelled Lorain Crane does the job . . . he lifts the load and drives the crane. One man does the work of a whole crew. And Lorain Crane efficiency never varies with the hour or the weather.

LOOK
GET PLUS SERVICES

And for a real "bonus" — perform jobs that other specialized material handling equipment cannot do — you can keep a Lorain Crane busy on plant maintenance and construction, steel erection, machinery installation, plus the "101" extra uses you're sure to find.

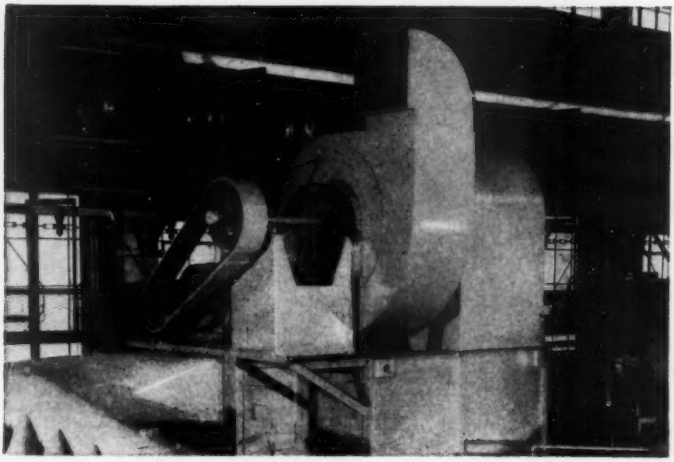
☆ You can do *MORE* with a LORAIN Rubber-Tire Crane than with any other single type of material handling equipment

Every one of these material handling jobs (and many more) *could* be handled in *your* yard . . . if a Lorain rubber-tire crane were on the job. *One mobile, rubber-tire Lorain Crane* can replace many pieces of single-purpose material handling equipment. With this mobile, one-man machine you are ready for any job . . . never "caught short" when tough lifts — or emergency jobs — come along. A Lorain handles the big as well as the little jobs. A Lorain will eliminate costly delays, save time and money. Investigate this modern material handling method at your Thew-Lorain Distributor . . . and start these many savings NOW!

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN®

RUBBER-TIRE CRANES FOR INDUSTRY



Another Clarage Installation in One of America's 97* Largest Industrial Enterprises

Above you see one of the twelve Clarage Improved Exhausters on a vital-to-production dust collecting job in Monroe, Mich. plant of the Ford Motor Company.

These twelve fans operate in connection with twelve American Air Filter Company's Roto-Clone installations.

Ford Motor Company has used Clarage equipment for over a quarter century.

Counting all of this Company's plants, well over a thousand Clarage fans are now handling the many and varied air handling requirements of this leading automotive and defense materiel manufacturer.

You can RELY on Clarage equipment to give you economical, dependable service for a long time to come.

***97**

OF AMERICA'S 100 LARGEST CORPORATIONS

are users of Clarage equipment . . . This wide acceptance denotes the high quality and reliable performance of Clarage products.

YOU CAN RELY ON

CLARAGE

HEADQUARTERS FOR AIR HANDLING & CONDITIONING EQUIPMENT

Clarage Fan Company 605 PORTER STREET **KALAMAZOO, MICH.**

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

ONLY A BALL

has { one dimension / one surface

but oh—how important

Important not only in precision ball bearings, but also in the lot of other applications where Strom metal balls have been doing the job better. Strom has been in on a great many ball-application problems, and knows how important these two factors are for the best results.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

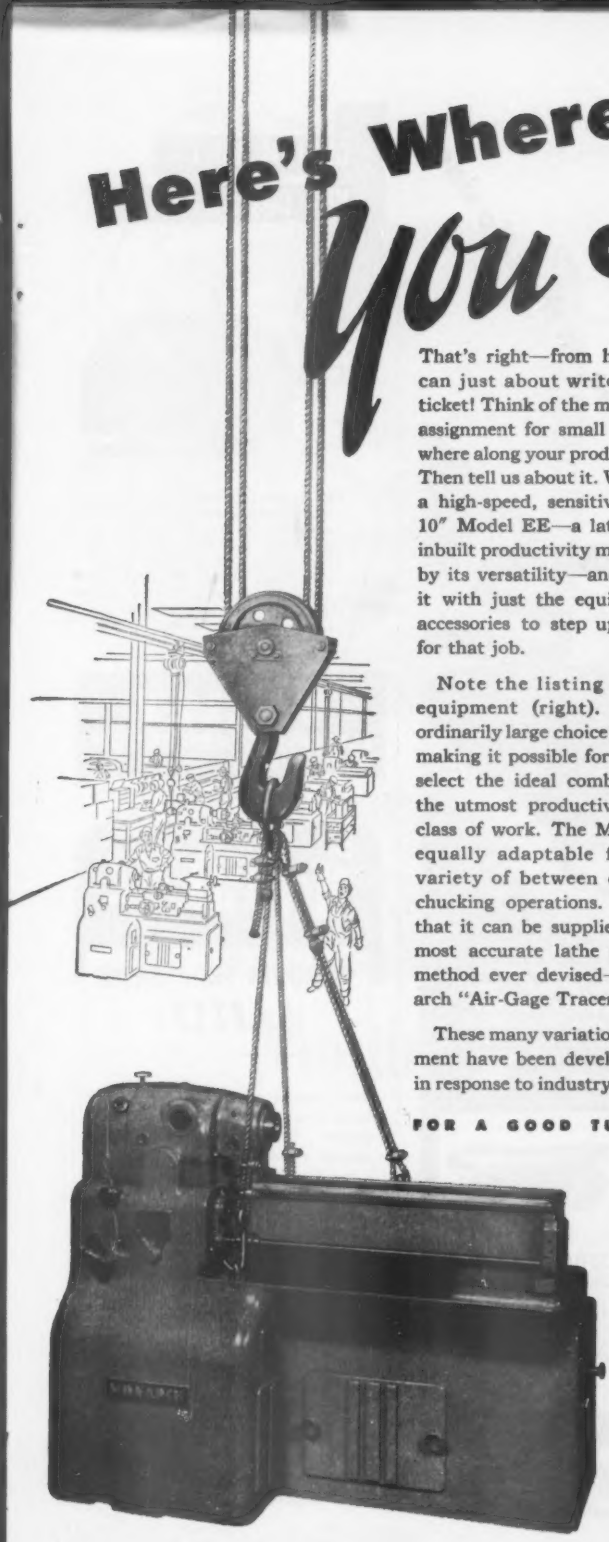
Strom

STEEL BALL CO.

1850 South 54th Avenue
Cicero 50, Illinois

Largest Independent and Exclusive Metal Ball Manufacturer

Here's Where *You* Come In!



That's right—from here on you can just about write your own ticket! Think of the most exacting assignment for small lathes anywhere along your production lines. Then tell us about it. We'll deliver a high-speed, sensitive Monarch 10″ Model EE—a lathe with an inbuilt productivity matched only by its versatility—and you'll get it with just the equipment and accessories to step up standards for that job.

Note the listing of typical equipment (right). An extraordinarily large choice is available, making it possible for the user to select the ideal combination for the utmost productivity on *his* class of work. The Model EE is equally adaptable for a wide variety of between center and chucking operations. Note, too, that it can be supplied with the most accurate lathe duplicating method ever devised—the Monarch "Air-Gage Tracer."

These many variations in equipment have been developed solely in response to industry's demands that we make the basic Model EE design available for constantly widening uses. Could anything we say speak better for its design and specifications? Some place—*many* places, perhaps—this outstanding Monarch lathe can improve your production at lower cost. Send the coupon today for full details . . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

TYPICAL EQUIPMENT

- "Air-Gage Tracer"
- Steady rest
- Follow rest
- Taper turning attachment
- Collet attachments
- Air equipment
- Bar feed attachments
- Collet chucks
- Jaw chucks
- Step chucks
- Stops
- Micro-gaging diameter dial
- Hexagon power feed bed turret
- Hand operated cut-off slide
- Variable feed control
- Ball turning rest

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

Gentlemen:
Please send me without obligation your Booklet No. 1003 covering the Monarch Precision Manufacturing Lathe—Model EE. *(It's that new one with 28 pages and a host of those sparkling Monarch illustrations.)*

NAME _____

COMPANY _____ TITLE _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

WILLSON

comfortable eye protection

keep you on the safe side

WILLSON GOGGLES

Willson goggles offer you greatest value because they are carefully designed for comfort and appearance as well as for the eye protection you need. Choose from a wide range of Cup and Cover-All® types like those illustrated. All are fitted with Super-Tough® heat-treated glass lenses—all fully pre-tested. You're *sure* when you ask for Willson goggles—*safer* when you wear them.

COVER-ALL® CUP GOGGLE No. CC60

Heavy duty goggles allowing plenty of room for prescription glasses to be worn safely and comfortably.

RUBBER MASK GOGGLE No. X41

Ideal for chemical workers. Rolled inner edge makes them fit snugly with utmost ease.

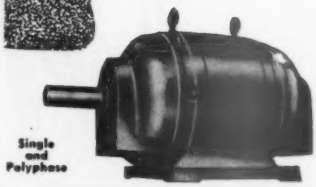
STYLE DL31

Deep perforated metal cups provide direct ventilation yet exclude dust. Ideal for use in hot, dusty atmospheres.

See your WILLSON distributor or write for bulletin

WILLSON PRODUCTS, Inc., 218 Washington St., Reading, Pennsylvania

CUSTOM-BUILT — NOT CUSTOM PRICED



Single and Polyphase

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

Write for Complete Details Today

VALLEY ELECTRIC CORPORATION

4221 FOREST PARK BLVD. · ST. LOUIS 8, MO.

HANDEEZ

REMOVES SHOP GRIME *SAFELY!*

Don't confuse HANDEEZ with ordinary harsh abrasive-action hand cleaning compounds. HANDEEZ works differently—through a gentle emulsifier blended with a sterilized vegetable emollient. It lifts grime from the pores, leaving skin tissue unharmed and unbroken by tiny crevices which invite infection. Cutting oils and other deep-seated shop grime yield readily to the HANDEEZ formula which spells prompt, efficient cleansing with the added skin-safety factor.

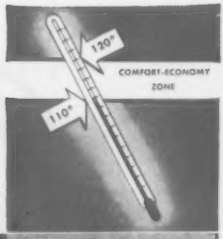
Write for the booklet "Be Kind to these Hands."

dependable DOLGE

WESTPORT, CONNECTICUT

Modine steam and hot water units are built in Horizontal (illustrated), Vertical Delivery and Power-Throw models.

Three of the many reasons why engineers rate Modine the standard of excellence



Discharge air temperatures of 110°-120° F. are correctly related to air velocities — assure perfect heating comfort plus lower fuel costs.

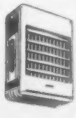
Sturdy, steel, integral fan guard offers safety from exposed fan — serves as a resilient, vibration-absorbing mounting for the unit's motor.

Sound-silencing features assure quieter operation — certified by accurate laboratory sound ratings. Especially important for commercial and institutional use.

YES, by any standard Modine gives you more —

ALL unit heaters are not the same. And it's advanced engineering that makes the difference. Consider performance: Modine balances discharge air temperatures, velocity and volume to give you perfect heating comfort. As for economy — your fuel bills are smaller because Modines deliver heat where and when it's needed. Call your Modine representative today. He's listed in the classified section of your phone book. Or write Modine Mfg. Co., 1505 DeKoven Ave., Racine, Wis.

WHEREVER GAS IS AVAILABLE, MODINE GAS UNIT HEATERS GIVE YOU LOW-COST HEATING!



Modine is the only gas-fired unit heater with both *stainless steel* heat exchanger and burner.

Get a recommendation based on your needs. Write for facts on steam and hot water (Bulletin 149-A) and gas-fired (Bulletin 651) Unit Heaters.

U-1165

Modine UNIT HEATERS

Pyrene

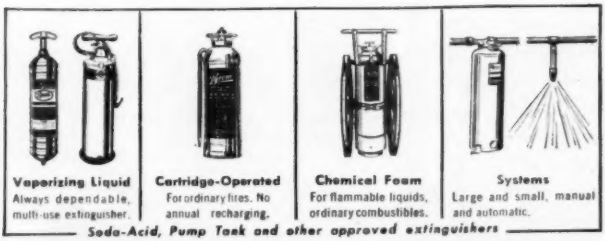
REG. U.S. PAT. OFF.

CAREFULNESS ISN'T ENOUGH
YOU NEED PYRENE, TOO!

There's a Pyrene for every fire hazard

The watchword of fire prevention is *Be Careful.* But fire may come—any time. When it does, Pyrene* can make the difference between a harmless scare and a gutted business. Whatever your fire hazard, there's a Pyrene to cope with it—for Pyrene makes everything from hand extinguishers to complete automatic fire-fighting systems.

*T.M. Reg. U.S. Pat. Off.



Vaporizing Liquid Always dependable, multi-use extinguisher.

Cartridge-Operated For ordinary fires. No annual recharging.

Chemical Foam For flammable liquids, ordinary combustibles.

Systems Large and small, manual and automatic.

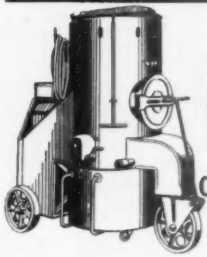
Soda-Acid, Pump Tank and other approved extinguishers

PYRENE MANUFACTURING COMPANY
690 Belmont Avenue Newark 8, New Jersey
Affiliated with C-O-Two Fire Equipment Co.

WHY SWEEP IT?

WHY BLOW IT AROUND?

REMOVE IT ONCE AND FOR ALL WITH HOFFMAN HEAVY-DUTY Vacuum Cleaning



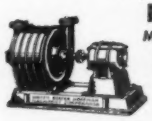
FREE SURVEY Shows How Your Plant Can Cut Costs—Speed Production

Hoffman equipment saves on plant maintenance, spurs production by removing dust and dirt in one operation . . . no re-handling! Fast, flexible cleaning that goes anywhere—floors, walls, overhead areas, in and around equipment (also while plant is operating). Recovers valuable material—removes fire and explosion dust hazards—boosts employee morale.

Hoffman "Hoffco-Vac" portables are built for rigorous industrial cleaning. Four sizes: 1½, 3, 5 and 7 H.P. models. Also, a 5 H.P. gasoline operated model. Write for Bulletins.

STATIONARY SYSTEMS for cleaning in several locations at one time, at a moment's notice. Permanent piping throughout plant conveys dust pneumatically to central point for easy disposal. Designed to your requirements by Hoffman engineers. Write for Bulletins.

For Lifetime Efficiency—Low Power Cost



HOFFMAN
Multistage Centrifugal
BLOWERS and EXHAUSTERS
Write for Bulletin A-650

Pressures: 1 to 8 P.S.I. Volumes: up to 7,500 C.F.M. Comparable at Vacuum.

U. S. HOFFMAN
MACHINERY CORPORATION
AIR APPLIANCE DIVISION
102 EAST 12TH ST., NEW YORK 3, N.Y.
CANADIAN PLANT: NEWMARKET, ONT.

BE PREPARED { *To increase production* / *To lower costs*

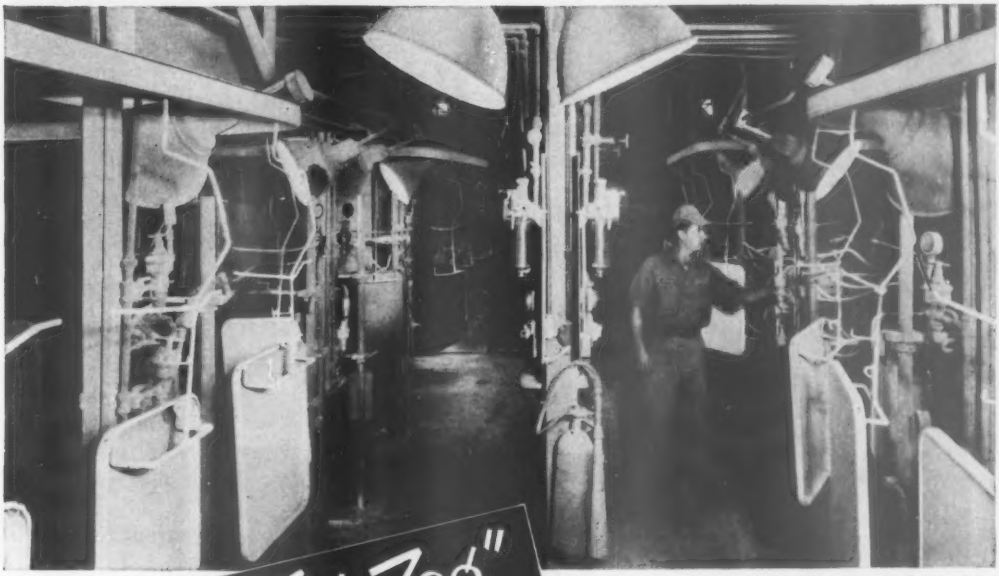


Photo courtesy Hamilton Mfg. Corp.

with R-W "Zig-Zag"® Continuous Power Conveyor

Are you prepared to get the maximum efficiency possible from your production line? Or are you face to face with a profit-eating handling bottleneck? Well, here's the answer to your problem—Richards-Wilcox ZIG-ZAG Continuous Power Conveyor.

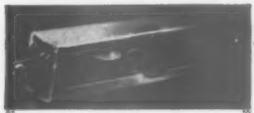
ZIG-ZAG Continuous Power Conveyors are a patented and exclusive engineering achievement of Richards-Wilcox. You'll find them constantly at work in every type of industry—boosting production, lowering costs, solving man-power problems and raising production line efficiency.

ZIG-ZAG Conveyor Systems are remarkable for their versatility and adaptability. Their unique construction features make them quickly, easily and safely convertible to handling materials in almost any industry. Each unit is engineered to fit perfectly into existing layout and conditions.

Tremendous savings in manpower costs and time pay for the installation often in less than a year's time. See how you can bring bigger profits, maximum efficiency to your production line. Check up on R-W ZIG-ZAG Continuous Power Conveyors with your nearest dealer today.

• • •

For complete details, or a prompt engineering consultation without any obligation, write our nearest office today.



Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

AURORA, ILLINOIS, U.S.A. *Branches in all principal cities*

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS
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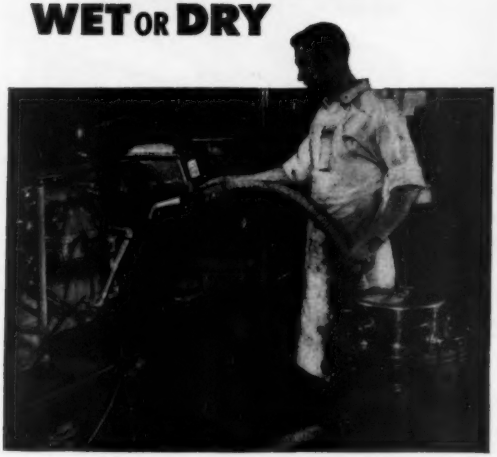
1880 RICHARDS WILCOX R-W AURORA TRADE MARK Reg. U. S. Pat. Off. 1952

OVER 72 YEARS

FOR FAST, THOROUGH, CLEANING WET OR DRY



It's the G-E Heavy-Duty Cleaner

Try this G-E portable unit on your cleaning job — you'll find it without equal! Unskilled help takes to it in a hurry; and your janitorial department jumps in efficiency.

These compact G-E cleaners are powerful, with a full one horse-power vacuum unit. Their low weight, only 51 pounds, makes them easy to roll along aisles and around machinery. This flexibility of use minimizes disturbance of normal business operations.

Nozzles are extra wide for fast coverage of flat surfaces, while other attachments speed the cleaning of hard-to-reach areas. It takes only an instant to change the unit to a blower.

This G-E works just as well on wet cleaning—just needs a quick change from filter bag to wet pick-up container, and it's ready to gather suds, over-flow, and other slop.

Mail in the coupon for data on what the G-E can do for you.

Heavy-Duty Cleaning Equipment

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, Dept. 22-1333
1285 Boston Ave., Bridgeport 2, Conn.

Without obligation, please send complete details on heavy-duty cleaning equipment.

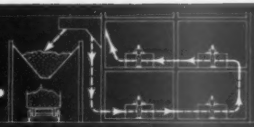
NAME .....

FIRM .....

ADDRESS .....

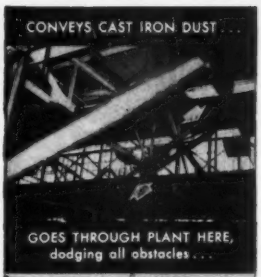
CITY ..... ZONE ..... STATE .....

upstairs... downstairs...



ALL AROUND YOUR PLANT— Hapman TUBULAR CONVEYORS

can carry flowable materials at tremendous savings!



IF YOU HANDLE flowable materials similar to *any* of these **PRODUCTS:**

Bulk Chemicals: (Wet dry, abrasive, corrosive, radioactive)

Food: Starch, flour, malt, grain, coffee or

BY-PRODUCTS:

Metal Chips from machine tools . . .

Sludge from quench tanks or grinding wheels . . .

Coal or clay, etc.

YOU MAY REAP ENORMOUS SAVINGS— some of America's most cost-conscious firms are doing it — with plant-wide systems of Hapman Tubular Conveyors. The list of materials you can handle is almost endless. You gain great advantages, both mechanically and in terms of labor saved. The stakes are high — why not investigate now? Write today for Bulletin FM-1052.

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

You can't stop a bullet with a catcher's mitt

You can't stop corrosion with ordinary paints...

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

BECAUSE the six Bitumastic® Protective Coatings, unlike maintenance paints, are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. And when you keep moisture away from an exposed surface, you *stop* corrosion.

BECAUSE Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable.

BECAUSE Bitumastic Coatings provide up to 8 times the film thickness of conventional paint coatings.

BECAUSE Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains heat-resistant metallic base.*

----------SEND FOR SET OF FREE BOOKLETS!----------

Koppers Company, Inc.
Tar Products Division
Dept. 1053-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

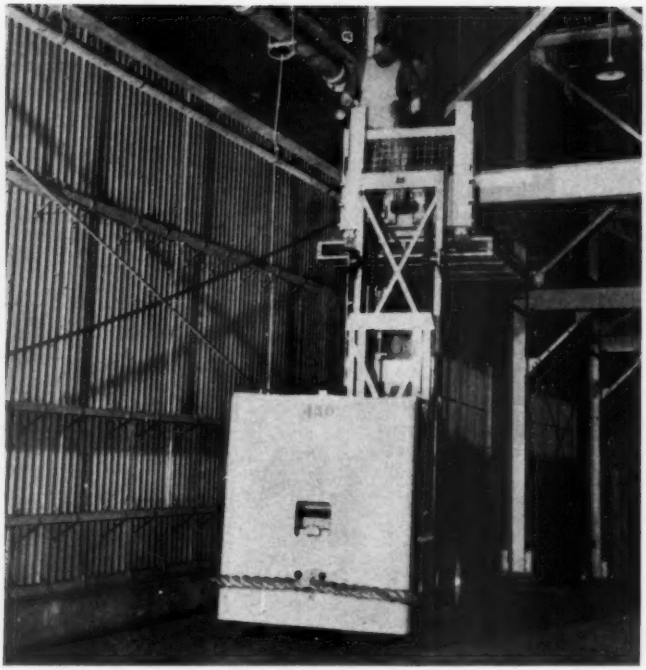
City.....Zone.....State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, 1053T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.



Material Handling plus Maintenance

This industrial truck, regularly employed for handling material in unit loads of 2000 to 4000 pounds, serves also to save time on many kinds of plant-maintenance jobs.

It is powered by a 23-cell D3 EDISON Nickel-Iron-Alkaline Storage Battery assembled in a demountable steel box, rated capacity 20.16 kwhr, which has been found ample for full-shift truck operation. Exchanging batteries at the end of one shift, gives the truck operating power for the next shift.

The battery is charged from current produced wholesale by a central station—the lowest cost power obtainable. In combination with a high-torque electric motor, it gives the truck an instant flow of power for starting and acceleration, yet is instantly and completely off during the many momentary pauses between the forward, back, up, down, and tilting motions of the truck while engaged in picking up, carrying, tiering and setting down loads.

The electric-motor drive is just as dependable and trouble-free as in stationary-machine drives. The battery, its cells made of steel, its alkaline electrolyte a preservative of steel, its principle of operation foolproof, is the longest-lived, most trouble-free of all types of storage batteries. Send for our bulletin *Modern Material Handling* for more information on the advantages of the unit-load method of handling material, the power requirements of industrial trucks and the characteristics of EDISON batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

YOU CAN ALWAYS RELY ON

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

all purpose - all surface

Paintmark

the

"STICK OF PAINT"

Paintmark

- Makes a clear, bright durable mark
- Handy to use—no more messy paint pot
- Water-resistant, weatherproof
- Paint will not get hard or crusty
- Economical—time-saving

USE IT ON ANY ROUGH OR SMOOTH SURFACE!

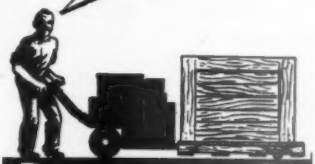
Assorted Colors—Packed 12 Boxes in Carton

There's an American marker for every job in industry. FREE! Industrial Crayon Guide. Dept. F-50.

the AMERICAN CRAYON company Sandusky, Ohio

FREE!

Revolvator's new Truck Index helps you pick size, capacity and type to suit your needs. Send coupon today.



REVOLVATOR CO.

REVOLVATOR CO.
8861 Tonnele Ave., North Bergen, N. J.

Gentlemen:
We want to know, without obligation, all about Revolvator Go-Getter Pallet Type Liftrucks.

Name.....

Position.....

Company.....

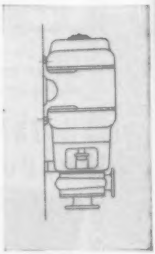
Address.....

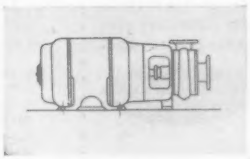
SQUEEZED FOR SPACE?

If plant expansion pains have you squeezed for floor space, Fairbanks-Morse *Builtogether* Centrifugal Pumps can help solve your problems.

These compact, efficient pumps can be mounted horizontally, vertically, or on an angle . . . on the floor or from the ceiling. Backed by the Fairbanks-Morse reputation for quality, these pumps will always deliver outstandingly dependable performance. An important extra advantage to you is the fact that both motor and pump are built by Fairbanks-Morse . . . your assurance of efficient service.

Fairbanks-Morse Builtogether Pumps are available in both single and two-stage models . . . in capacities up to 1000 gallons per minute against heads up to 550 feet. For complete information, see your local Fairbanks-Morse Branch, or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.





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custom-engineered
POWER

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Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

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PRODUCTS COMPANY

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CLEVELAND 12, OHIO

Attach coupon to your letterhead for your copy of Bulletin 2-200

NAME _____
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE ____ STATE _____
X-14

PALMETTO CUTNO® and a DeLaval IMO

team up to resist caustic bite for American Viscose Corp.

In the busy Nitro, W. Va., plant of American Viscose Corporation alkalis behave when Palmetto and DeLaval are called upon for service.

A DeLaval Rotary Pump — type IMO — packed with Palmetto Cutno handles caustic soda — carbon bisulphide at 55 F, and 95 psi at variable speeds between 178-355 rpm. A great pump and a great packing mated for efficient economical operation.

Palmetto Cutno, the *standard* anti-alkali packing, resists caustics in all concentrations — all temperatures. Its special lubricant-compound cannot "soap out" because it does not saponify . . . and like in all other Palmetto Self-Lubricating Packings, each individual strand is impregnated with the lubricant *before* the packing is constructed.

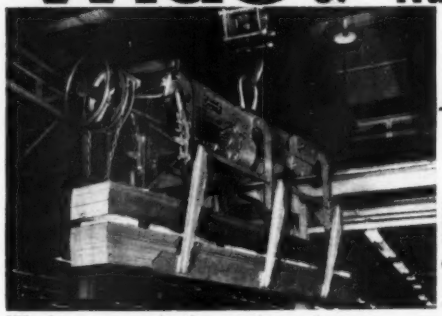
Write for PC-101 . . . the catalog that describes all Palmetto Packings in detail.

PALMETTO Packings

packing more performance into every application

GREENE, TWEED & COMPANY
NORTH WALES, PENNSYLVANIA

Wide *or* Narrow...

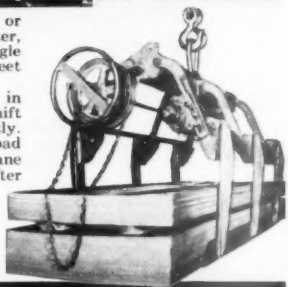


1 C-F LIFTER HANDLES THEM ALL

Whether your production requires a few or many widths of sheet steel, 1 C-F Lifter, with its wide range of jaw and carrying angle adjustments will probably meet all your sheet handling requirements.

Adjustments are made by the operator in a few seconds, permitting the Lifter to shift from wide to narrow sizes almost instantly.

Because it can pick up, carry and unload more loads per hour, using less man and crane time than any other method, a C-F Lifter will soon pay for itself.



Bulletin SL-28 gives you the complete story of C-F Lifter advantages to you. Ask for it today. There's no obligation.

CULLEN-FRIESTEDT CO.
1321 South Kilbourn Avenue • Chicago 23, Illinois

It's Right at our Finger Tips

One of our most important jobs is keeping an eye on freight shipments while they're in our care. For example, a manufacturer's production schedule may depend on the arrival at destination of a certain car or cars on a specific date.

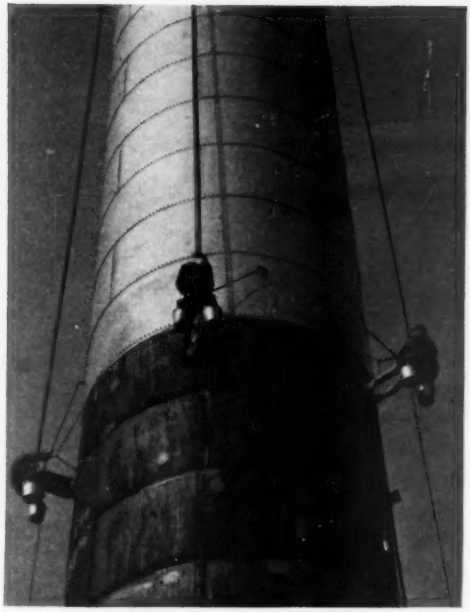
That's the reason for our having what might be called a "three tell" tracing system, making effective use of telegraph, telephone and teletype. This dependable 3-way system *tells* us the exact location of any freight shipment. The information is *right at our finger tips.*

* * * * *

For helpful cooperation and information, call our nearest Union Pacific freight man at any time.

Be Specific – Ship "Union Pacific"

(Offices in 70 cities throughout the U. S. A.)



DON'T RISK PAINT FAILURE

New, free book brings industrial painting facts up to date. We don't make paint. But to help you get full value from the paint you buy, we'll send you this fact-packed book on aluminum paints. Read it before you plan another paint job. It can save you time and dollars.

You may know that aluminum paint is best for many places in your plant. But do you know what *kind* of aluminum paint is best for each job? Some are specially formulated for painting metal and masonry, others for wood, others for heated surfaces. Mail the coupon for the free book that answers these and hundreds of other paint questions.

SEND FOR FREE BOOK

ALUMINUM COMPANY OF AMERICA,
Paint Service Bureau, 1792-K Gulf Bldg., Pittsburgh 19, Pennsylvania.

Please rush me free copy of "Painting with Aluminum."

Name (please print)_____

Address_____

City_____ State_____

We plan to paint the following_____

Look for this shield on aluminum paints made by many paint manufacturers using ALCOA PIGMENTS.

ALCOA

ALBRON ®

HEAVY DUTY 10-TON WAYNE CRANE

saves 2 ways... { LESS MAN-HOURS / LESS MACHINE-HOURS

BECAUSE

either... SIMULTANEOUSLY or... INDEPENDENTLY

This "full functioning" feature of Wayne Crane eliminates stopping, clutching and shifting that waste time and cause unnecessary wear—results —more production, less costly downtime.

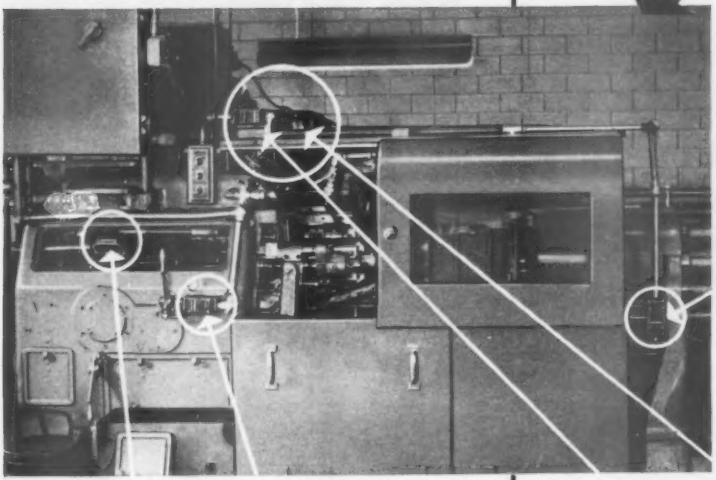
Eight-ton crawler and 12½-ton truck-mounted models also available. Write for specifications and prices. You'll like both.

WAYNE CRANE DIV., AMERICAN STEEL DREDGE CO. INC.
DEPT. F, FORT WAYNE, INDIANA

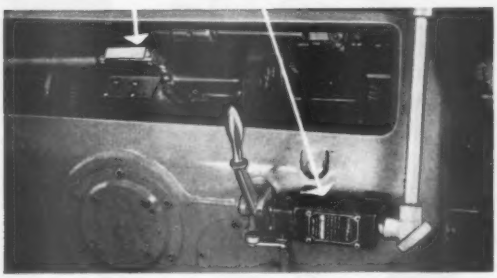
How one plant engineer used 5 MICRO Precision Switches to make a six-spindle screw machine best suited to his production needs!

Plant operating men have found hundreds of uses for MICRO precision switches on present plant equipment to make the operation of their machines best fitted to their production needs.

These illustrations show how one plant operating man used five MICRO precision switches to make the operation of a six-spindle screw machine more perfectly adapted to his specific needs.



MICRO "5ML1" limit switch (above) that is operated by the chuck closing shoe. This switch must be operated at the same time as the one on the hand closing lever or the machine will stop, thus preventing damage to the shoe and the chuck opening and closing mechanism.



The MICRO general purpose limit switch at upper left has a roller arm actuator. If a part that has been machined becomes jammed in the collet and is not ejected properly, this switch shuts off the motor before damage can occur.

A MICRO "1ML1" limit switch is operated by the hand starting lever as shown at lower right. If the collet is not fully closed, the machine will not start.

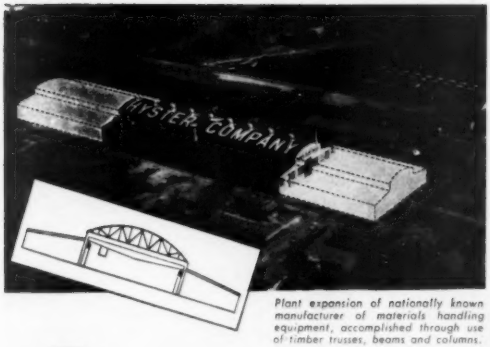
The MICRO "1ML1" heavy duty limit switches shown above operate when the shields on either side of the machine are slid open. This action operates one or the other switch which shuts off the power until the shield is reclosed. This adds to safety of the operator and keeps oil from splashing on the floor.

MICRO distributors are located in over a hundred key cities to supply just the right switch to meet your plant application need. Look for your nearest distributor in your classified telephone book under "Switches, Electric."

MICRO
MAKERS OF PRECISION SWITCHES

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

FREEPORT, ILLINOIS



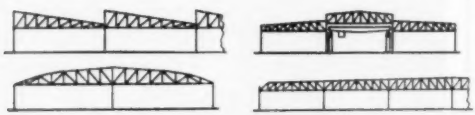
Plant expansion of nationally known manufacturer of materials handling equipment, accomplished through use of timber trusses, beams and columns.

Expandable Buildings for Growing Industry

Readily available in desired spans, trusses and framing by Timber Structures, Inc., provide the practical answer to new industrial plant construction and to expansion of existing buildings.

These structural units are genuinely economical, both as to initial cost and lack of maintenance. Flexible and adaptable, they are suitable for any roof contour—flat, arched, sawtooth, or monitor. Design may include local loadings such as hoists, monorail installations, heating, ventilating units.

Details of span, dimensions, construction and common adaptations are contained in new booklet, "Industrial Buildings". Your nearest Timber Structures office has a copy for you; or fill in and mail the coupon.



TIMBER STRUCTURES, INC.

P. O. Box 3782-O, Portland 8, Oregon

Offices in New York, Chicago, Detroit, Kansas City, Dallas, Seattle, Spokane

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THREAD-CUTTING SCREWS
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PIPE PLUGS
STOVE BOLTS
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ELCO TOOL AND SCREW CORPORATION

1918 BROADWAY • ROCKFORD, ILLINOIS

"Most valuable player" IN THE LEAGUE

Again Emery's AIR PROCUREMENT SERVICE is acclaimed by the Nation's leading purchasing and production executives as the outstanding air shipping service in making "on-time" delivery from any point in the Nation right to production lines.

When it comes to all-round performance—day or night, rain or shine—Emery's AIR PROCUREMENT SERVICE has what it takes to get needed deliveries to you faster and more dependably than any ordinary shipping service.

Only Emery uses *all* airlines, *all* transportation—passengers or cargo, express or freight—everything that moves in the air and on the ground!

Only Emery maintains absolute control of your shipment all along the way through its own nationwide private wire system and coast-to-coast corps of expediters!

Only Emery knows where your shipment is at all times . . . takes instant action to route it around trouble spots!

Only Emery can tell you when delivery will actually be made . . . or let you know in plenty of time if delivery is unavoidably delayed.

These are the reasons why Emery is rated the most valuable player in the air shipping league. You, too, can call on Emery any time . . . then sit back while "The World's Fastest Transportation System" scores another win for you!

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Transite Pressure Pipe for your industrial water lines...

...because it reduces Pumping Costs

With Transite* Pressure Pipe, there can be no tuberculation—the internal corrosion that (1) adds resistance to flow by roughening pipe and (2) chokes off flow by decreasing diameter. As a result, this corrosion-resistant asbestos-cement pipe assures you of the full flow characteristics so essential to a dependable factory water supply.

Reduces pumping costs—Formed on a polished steel mandrel for unusual smoothness, Transite Pressure Pipe has a high flow coefficient (C=140). It not only starts high but stays high. This property of the pipe keeps pumping costs at a minimum and effects substantial savings over the years.

Minimizes pipe sizes—With corrosion-resistant Transite Pipe, water systems may be designed without allowance for flow reduction due to tuberculation. This means minimum diameter pipes may be specified, in many cases materially reducing the initial cost of a system.

Many other important savings—Transite Pressure Pipe is light in weight, easy to handle, fast and economical to install. Its easily assembled, factory-made joints stay tight in service and reduce water losses. Its high corrosion resistance—outside, inside and all the way through—assures maintenance-free performance in a wide variety of soils.

Why not find out more about this long-lasting, cost-reducing pipe? Many of its installation and operating advantages are illustrated and described in detail in booklet TR-11A. For your copy, write Johns-Manville, Box 60, New York 16, N. Y.

*Transite is a registered Johns-Manville trade mark

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TRANSITE PRESSURE PIPE

for Water Supply Lines • for Fire Lines • for Process Lines

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PREVENTS RUST

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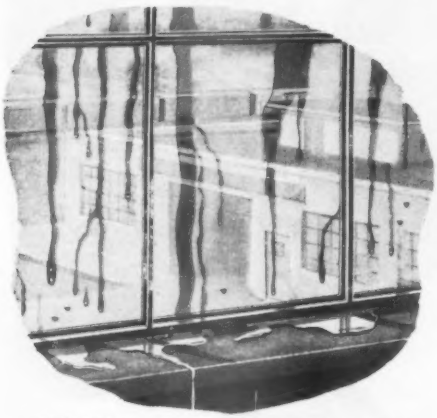
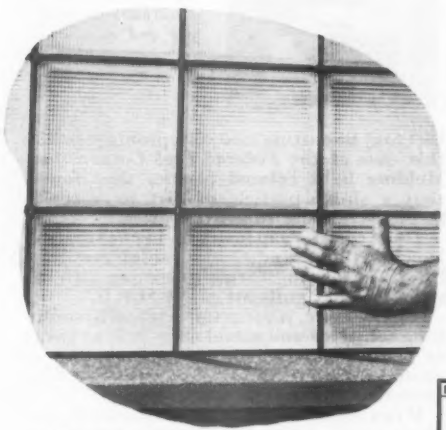
FACTS YOU SHOULD KNOW ABOUT

condensation control

WITH PITTSBURGH CORNING GLASS BLOCKS



QUESTION . . . In our mills, condensation must be minimized. Can PC Glass Blocks effectively help us?



ANSWER . . . PC Glass Blocks can certainly help solve your problem. For they virtually eliminate condensation on light areas. And, where other materials rot, rust, check, or warp, PC Glass Blocks remain unaffected.

In mills, plants and factories where high humidity is necessary to carry on manufacturing operations, or in places where this condition is the result of the processes involved, condensation is a critical problem which must be solved—for the sake of product uniformity, more efficient operation and greater comfort of workers.

This condition can be minimized when PC Glass Blocks are installed in window areas. PC Glass Blocks reduce surface condensation. Fact is, moisture will not condense on the room side of these panels, except under extreme temperature and humidity conditions. PC Glass Blocks avoid troublesome, dripping moisture.

The reason for this is that glass blocks are a *natural insulating medium*. They are hollow "all glass" units with fused seals made at high temperatures and relatively free of entrapped water vapor. The tight seal assures a dry, dead-air space within the block, resulting in an effective heat retardant. PC Glass Blocks have greater insulating value than an 8-inch brick wall; more than twice that of conventional windows.

Here are facts you will do well to consider—in building new structures, modernizing present buildings, or in replacing old, worn-out sash. We will be glad to consult with you on any problem concerned with condensation control or the better daylighting of your buildings. There is no obligation.

Other Facts: PC Glass Blocks cut heating and air-conditioning costs; reduce maintenance expense; admit abundant natural, controlled daylight; make more usable space available; cut off unwanted views; are immediately obtainable.

Distributed by Pittsburgh Plate Glass Company; W. P. Fuller & Co. on the Pacific Coast; Canadian Pittsburgh Industries Ltd., Hobbs Glass Div., in Canada; and by leading distributors of building materials everywhere.

Mail this coupon for complete information

PITTSBURGH PC CORNING

Pittsburgh Corning Corporation
Dept. P-102, 307 Fourth Avenue
Pittsburgh 22, Pa.

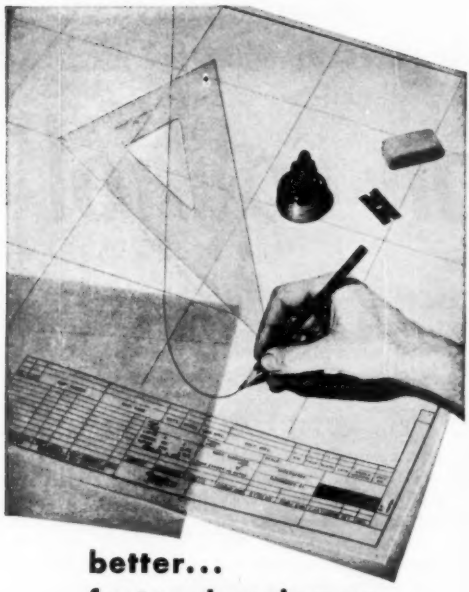
Please send me a copy of your FREE booklet, "The Mark of a Modern Building—PC Glass Blocks."

Name.....

Address.....

City.....State.....

PITTSBURGH CORNING CORPORATION · PITTSBURGH 22, PENNSYLVANIA



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faster drawing on

VINYLITE RIGID SHEET!

BRAND

Here's the newest, most advanced idea in drawing materials —semi-transparent sheets of VINYLITE Brand Plastic . . . with accurate grid lines and title blocks printed *from the back!*

This means that drawings can be made with more precision, more easily, for these sheets of VINYLITE Plastics are dimensionally stable—won't shrink or stretch. It means clean, quick erasures—even ink can be scratched off with a razor blade. Your pencil is never in contact with the printing that *shows through* the tough sheet!

What's more, sheets of VINYLITE Plastic are easy to keep clean—they won't absorb grease, are resistant to water, perspiration, chemicals, most acids and alkalies. Finger marks and smudges wipe off with a damp cloth. And VINYLITE Rigid Sheets are easy to handle—stiff and crisp, yet pliable, they roll up or lie flat—resist wrinkling, cracking, fraying and aging. Since drawings can readily be removed from them, they can be re-used again and again this new time-and-money-saving way.

VINYLITE Rigid Sheets are finding scores of uses in defense and basic industry—templates, calculators, precision drafting instruments, maps and photographic transparencies, for instance. Learn more about them. Write Dept. NJ-86.

Data on "Dinoglass" sheets courtesy Di-Noc Company, Cleveland, Ohio

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A Division of
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TORNADO®
CLEANING DOES!

Motor unit becomes powerful blower to clean motors, machinery and equipment.

Dirt may be cutting into your profits just like this case of the *Federal Tool Corporation*. Molding light colored plastic, they found that a single particle of dirt in a cavity meant scrapping the entire piece.

These costly scrap losses had to be stopped. How? With more efficient cleaning methods. Now they're using Tornado cleaning with the machine that pulls air at 300 M.P.H.

What's more, it picks up water, oils, scrubbing solutions and metal chips just as easily as dirt. It quickly converts to a blower or shoulder-type vacuum . . . cleans everything from floor to ceiling.

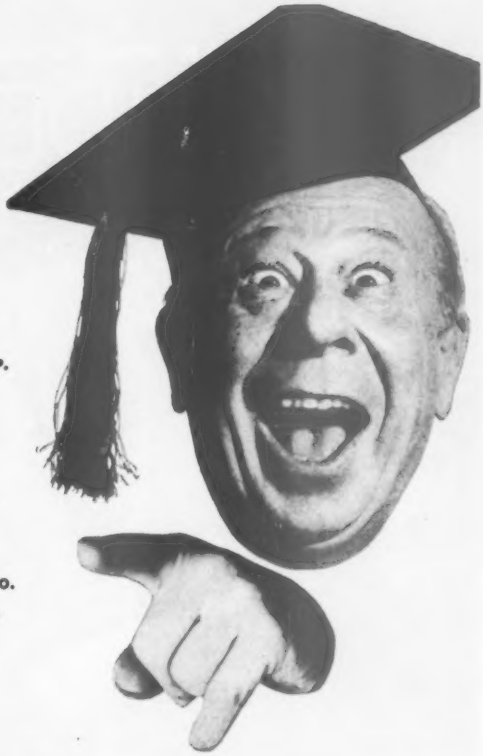
If you want to stop dirt from sharing in your plant profits write for Bulletin 600 today.

BREUER ELECTRIC MFG. CO

5084 NORTH RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS

Q.

Which of these 23 firms can reduce your costs—increase your sales?



AMERICAN SCREW CO. • ATLANTIC SCREW WORKS, INC.
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Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

A. *All of them . . . because all of them make Phillips Cross-Recessed-Head Screws*

Your customers recognize these nationally advertised fasteners as the clue to quality. Millions of readers of The SATURDAY EVENING POST are being constantly reminded that "X marks the spot." So, they're looking for Phillips Screws on the products they buy. That means extra sales for you.

And that's not all. You save time, work, and money with Phillips Wood, Machine, Tapping Screws or "Sems." They save up to 50% driving time, set up tighter, reduce damage due to slippage. Use them more . . . and get more sales.

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PHILLIPS *Cross-Recessed-Head* SCREWS

As Advertised in POST

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FOR THE MAN WHO WANTS

NEW IDEAS

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Whatever your problems in weighing, checking, testing, counting, batching, force-measuring and other weighing operations . . . there's a modern Toledo to do the job with high *accuracy, speed* and *dependability.* Have you checked your scale needs? Get latest information in this widely used reference on Toledos that help you guard costs . . . speed production. Look into the advantages of Printweigh in stopping losses that originate through human errors. Send coupon for new edition—"Toledo, Headquarters for Scales."

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Please send without obligation your new edition on modern ways to weigh with Toledos.

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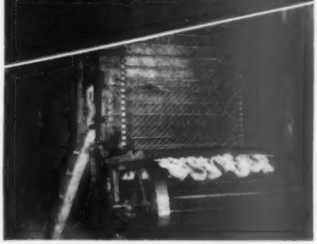
this conveyor belt is woolly, but not wild!



That's a true turnabout for this example of a specially designed Cambridge woven wire conveyor belt. This one carries wet, washed wool through a drying oven to remove moisture and washing chemicals from the fibre. There's no wild belt travel because the Cambridge Chain Drive design used here prevents the belt from riding from side to side across the pulleys . . . maintains straight belt movement.

Open mesh of the wire belt permits free, even heat circulation. All-metal construction gives longer belt life and lower maintenance costs.

Cambridge Chain Drive Attachment

Whether you're processing textile fibres, foods, chemicals, metal or ceramic products, a Cambridge woven wire conveyor belt can help you cut production costs and maintain product uniformity by combining movement with processing. But don't have the wool pulled over your eyes on conveyor belt design . . . be sure to call in your Cambridge field engineer for his recommendation on the proper—

CAMBRIDGE WOVEN WIRE CONVEYOR BELT —any metal or alloy, mesh or weave.

Write direct or look under "Belting-Mechanical" in your classified telephone directory.

FREE BELT MANUAL contains information on conveyor and belt design and specifications, metallurgical data and belt maintenance. Write for your copy today.

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OFFICES IN PRINCIPAL INDUSTRIAL CITIES

FORD MOTOR COMPANY OFFICIALS INSPECT THE INTERCHANGEABLE UNITS OF THE . . .

New G-E Motor Control Center

Since January, over 10,000 men from production and management of leading industries (see above) have taken a thorough look at the latest equipment for the centralized control of a-c motors up to 200 hp. Their reports indicate enthusiastic approval of what they saw. Here's why:

VERSATILE. Because units are easily interchangeable without waste space, a variety of arrangements can be made. For example—two Size 1 or 2 starter units require the same space as a Size 1, 2, or 3 reversing starter.

ACCESSIBLE. A four-inch continuous wiring trough provides ample wiring space. Components are mounted on an easy-to-handle frame and accessible from all sides when lifted from cabinet. Starters are front-connected. Master terminal boards can be swung out of compartment for extra working space around conduit.

PROTECTED. Will withstand 25,000 amperes RMS short-circuit current, substantiated by certified Laboratory tests.

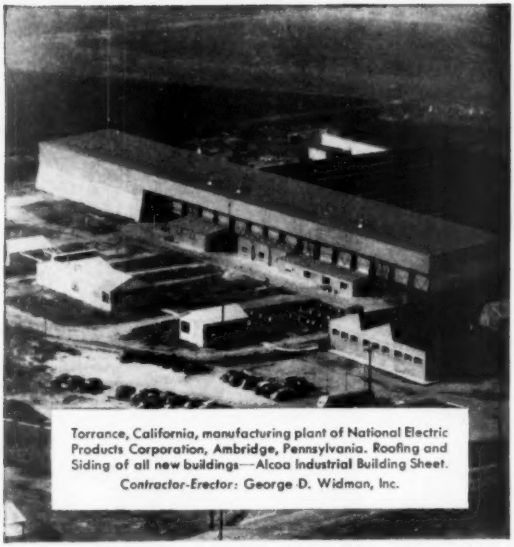
For more information on this new G-E motor control center, contact your nearest G-E apparatus sales office or write for Bulletin GEA-4979A today. *General Electric Company, Schenectady 5, N. Y.* 730-42

GENERAL ELECTRIC

EASY TO INSTALL AND INSPECT. Interchangeable units; main bus completely accessible; incoming line connections are easily made.

EASY TO WIRE. Four-inch wiring trough; components accessible from all sides; front-connected starters; doors swing more than 90°.

EASY TO SERVICE. Units are easily disconnected from bus and locked in test position (above). Barriers between units are easily removed to facilitate wiring (below).



Torrance, California, manufacturing plant of National Electric Products Corporation, Ambridge, Pennsylvania. Roofing and Siding of all new buildings—Alcoa Industrial Building Sheet.
Contractor-Erector: George D. Widman, Inc.

You can build FASTER with ALUMINUM!

Here's how National Electric Products Corporation put Alcoa Building Sheet to work. When facilities had to be expanded . . . fast—secondary buildings were erected to house the generators, pumps and compressors, freeing the main structure for additional electroplating and processing equipment. All the additions were built faster...built stronger—with Alcoa *Aluminum* Building Sheet.

Alcoa Aluminum Building Sheet cuts construction costs . . . goes up faster, requires fewer man hours of labor . . . *and lasts longer!* Lightweight Alcoa Building Sheet (only 56 pounds per square) reduces dead load. Low in first cost, lower still in future maintenance expense, it piles up big savings all the years of its extra long life.

FACTS FOR ENGINEERS

Alcoa Industrial Building Sheet may be erected over steel or wood; and there is a fastener for every type of job.
Lengths: 5 to 12 feet.
Widths: Roofing, 35 inches—Siding, 33¾ inches (32 inch coverage).
Thickness: .032 inches—equal to 22 U. S. Gauge.
For complete engineering and application details, write for booklet AD-167.

ALUMINUM COMPANY OF AMERICA
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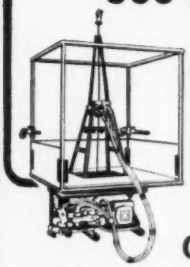
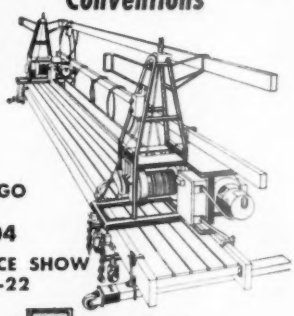
ALCOA
INDUSTRIAL BUILDING SHEET

See the ALBINA SWING STAGES



in operation at the **CHICAGO and CLEVELAND** *Conventions*

We want you to see ALBINA Swing Stages in operation. You can judge for yourself the smooth, safe operation and the savings it affords you. Units are electric and air operated and may be used as a stingle stirrup.



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ALBINA ENGINE & MACHINE WKS.
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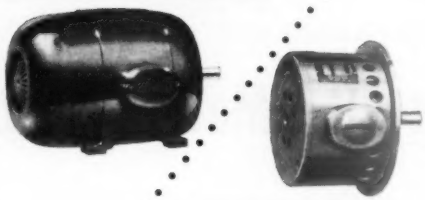
Standard



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Industrial electric motors are our only business

That's why we can give you prompt delivery on motors from 250 down to 1/6 H.P., single or polyphase—whether general purpose, totally enclosed, explosion-proof, splash-proof, sanitary, specials. Call your local Howell representative or write us direct.

HOWELL ELECTRIC MOTORS CO.
HOWELL, MICHIGAN

How to beat excessive Cover Wear on V-Belts!

(1) Check sheaves for worn grooves

(2) Check alignment between sheaves

(3) Check tightness of sheaves on shafts

(Sheaves must be tight on shafts to hold proper alignment. Worn grooves result in uneven side wall wear or running on bottom corners of belts, causing premature failure.)

(4) INSTALL BULL DOG V-BELTS . . . their wear-resistant, durable covers of closely woven, heavy, bias-cut fabric can take brutal punishment where belt meets sheave — also seal against penetration of dirt, grease and moisture.

Get the complete Bull Dog V-Belt quality story on covers, cords and compounds from your BWH distributor — soon.

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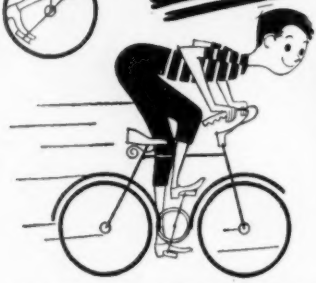
but a Bicycle is Better!



Struggling along with one wheel may be all right as the trick of the week, but for real progress *two* wheels are essential! . . . And in business as well, *two* telephone systems are required for smooth, efficient operation—your city telephones for incoming and outgoing service — and SELECT-O-PHONE for *inside* communications. SELECT-O-PHONE operates automatically and independently of your switchboard! It permits you to talk with from one to 55 inside stations, individually or collectively.

SELECT-O-PHONE frees your switchboard in inside traffic—saves manpower — increases efficiency throughout office or plant!

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An Associate of International Telephone & Telegraph Corporation

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Please rush your new "Hear's How" booklet that explains how I can benefit from Kellogg SELECT-O-PHONE Dial Intercommunication.

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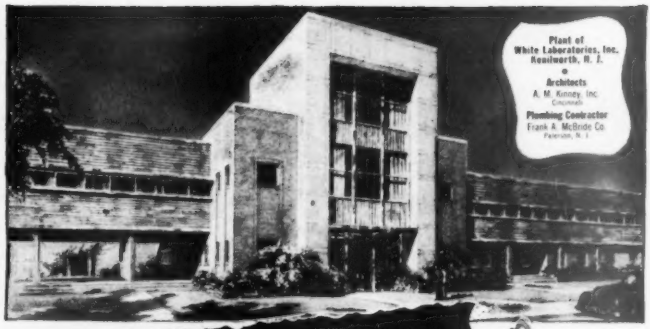

Outstanding IN ITS FIELD

The buildings housing the entire plant of White Laboratories are among the most outstanding in the pharmaceutical and drug industry. Needless to say Halsey Taylor Coolers were chosen, because they are equally outstanding, with their dependable sanitary features, modern design and economy of maintenance.

• Write for latest catalog.

The HALSEY W. TAYLOR CO., WARREN, O.

HALSEY TAYLOR drinking fountains

F-23

For Special Battery Chargers HERTNER IS YOUR BEST BET!

More and more, day after day, Hertner Electric is being called on to design and build special equipment for special battery-charging jobs . . . for electric trucks, motorized hand trucks, mine locomotives, railroads, telephone exchanges . . . wherever battery-charging equipment is required.

Illustrated here is a special-built, 4-circuit, unitized switchboard for charging four separate batteries simultaneously. Of these four batteries any can be one of six different types. This man-hour saver and space-saving charger is equipped with a motor generator with a capacity for four additional circuits, ready for future expansion.

Our staff of experienced engineers and modern production facilities are available to produce custom-built motors and generators to meet your exact requirements. *Standard model Hertner battery chargers are available for immediate shipment.* For complete information consult your electric truck or Hertner representative, or write direct.

Hertner

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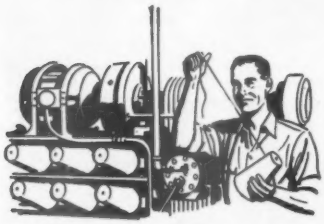
New York City has a conveniently located American Blower Branch Office to provide you with data and equipment for air handling. You can reach American Blower in New York by calling BRyant 9-2885. In other cities, consult your phone book.

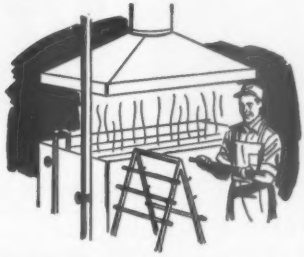


YARN ABOUT YARN . . .

A textile manufacturer was continually changing pulleys or setting the machine rate on his ring-spinning frames to fit the material that worked at the lowest speed. He'd heard about American Blower Gyrol Fluid Drives and decided to try them. Results were amazing. Gyrol Fluid Drive permitted a higher output within safe limits of the material, allowed spinning frames to start gradually with less yarn breakage. For your business, wouldn't smooth power transmission and adjustable speed control be a distinct advantage?

FOOD FOR THOUGHT . . .

Those magnificent new supermarkets springing up around the country are just as comfortable as they are modern. Many use American Blower Ventura Fans for ventilation the year round, and Venturafin Unit Heaters for winter heating. They meet a twofold requirement. First, both units are beautifully styled to harmonize with modern designs. Second, both units are quiet-operating—a necessity in modern stores. Our nearest branch office will be glad to furnish price and delivery data.



FUMES, VAPORS, GASES . . .

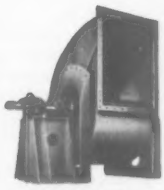
In addition to a wide range of standard ventilating equipment for industry, American Blower also offers special fans to handle corrosive gases, fumes, vapors. Some corrosive gases are vital to process work and must be circulated in the system with corrosion-resistant fans. Gases and fumes which affect the health and comfort of employees must be removed. There is an American Blower corrosion-resistant fan that will meet your requirements for those special applications in the process industry.

Whatever your needs, American Blower heating, cooling, drying, air conditioning and air handling equipment will improve over-all comfort and efficiency in your business. For data, phone or write our nearest branch office.

Unit Heaters

Ventura Fans

Air Conditioning Equipment



Industrial Fans

Utility Sets

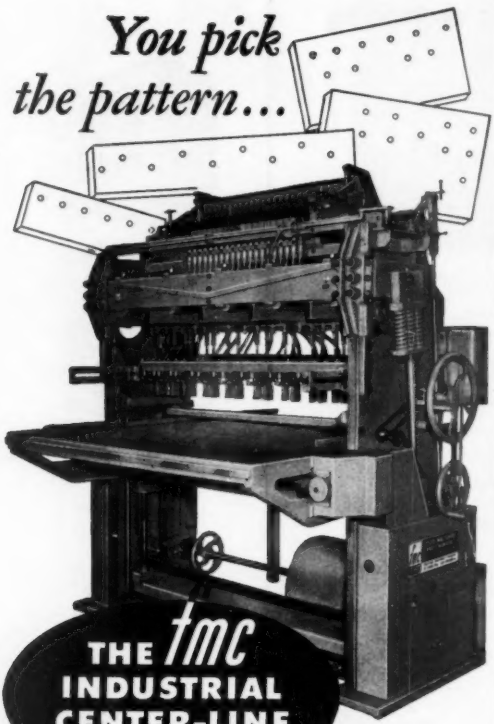
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

YOUR BEST BUY **AMERICAN BLOWER** AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

You pick the pattern...



THE fmc INDUSTRIAL CENTER-LINE NAILER WILL PICK *and drive* THE NAILS...!

This versatile nailing machine saves time and labor in the production of skids, pallets, grain doors, outdoor furniture, cooling tower panels and other types of wood fabrication. Available in 3 standard machine widths, 48″, 66″ and 80″. Nailing chucks can be adjusted for in-line, staggered, clustered, or group nailing patterns on level, angled, or variable height surfaces. Automatically selects and drives up to 24 nails per stroke. Handles any size nail from 3d to 10d, including common, smooth box, cement coated box, copper, aluminum, drive screw, or ring shank. Special jigs and nailing tables can be designed to specific nailing requirements.

fmc–*Send* FOR ILLUSTRATED BULLETINS

FOOD MACHINERY AND CHEMICAL CORPORATION
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NM-18A

Is Your Sound System "DATED"?

IN THE DAYS of tri-cornered hats a hearty voice could be heard in even the largest factory. But today, with machinery and hundreds or thousands of employees, the hearty voice is out-dated and a modern high quality sound system is essential for safe and economical plant operation.

With an **ALTEC** sound system the quick dissemination of facts and orders to every employee in any or all parts of your plant saves time and money. Music played during the hours when fatigue and boredom are high can reduce accidents and increase productivity. In case of disaster your Altec sound system can avert panic and save lives and equipment.

Hundreds of factories, offices, stores, airports, stations and entertainment places have found that only Altec has the quality and diversification to fulfill every requirement for sound equipment. Whether you have ten or ten thousand employees, you should have an Altec sound system. It will save time, money and lives.

ALTEC Sound Systems are an intelligent business investment

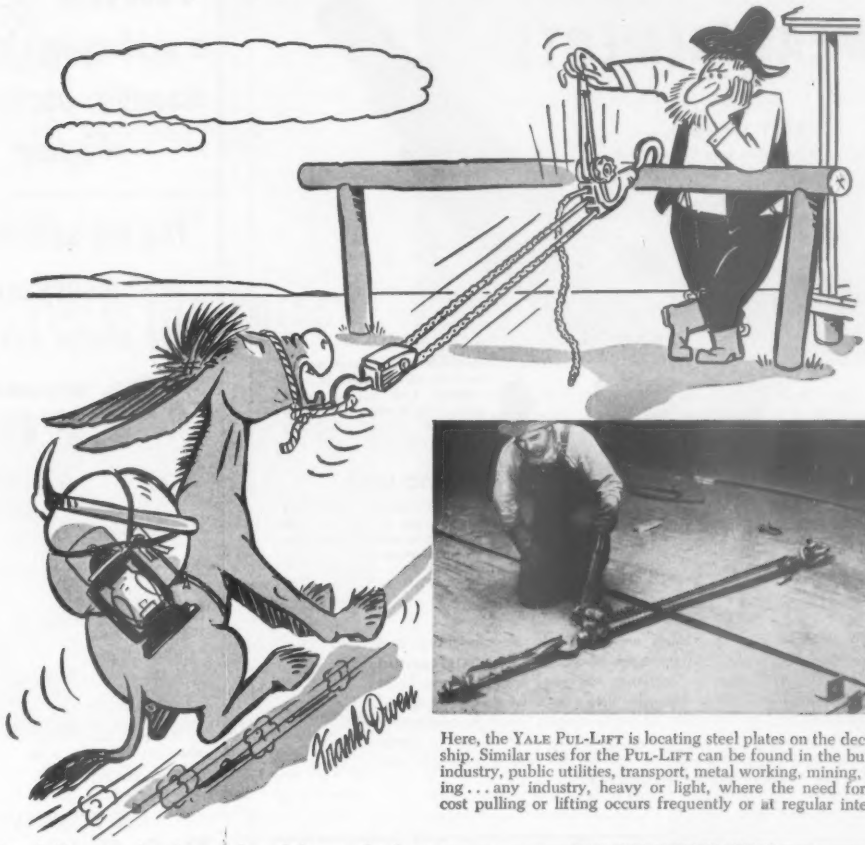
Call your Altec dealer or write...

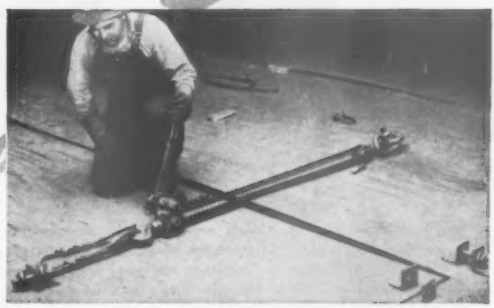
ALTEC
LANSING CORPORATION

9356 Santa Monica Blvd.
Beverly Hills, Calif.

161 Sixth Avenue
New York 13, New York

There's a YALE hoist for every lifting need!





Here, the YALE PUL-LIFT is locating steel plates on the deck of a ship. Similar uses for the PUL-LIFT can be found in the building industry, public utilities, transport, metal working, mining, farming . . . any industry, heavy or light, where the need for low-cost pulling or lifting occurs frequently or at regular intervals.

Industries of all types solve thousands and thousands of difficult *lifting* and *pulling* problems with the YALE PUL-LIFT. Universal ratchet action makes it as easy to use as a wrench . . . light weight means one-man operation . . . exclusive YALE design provides capacities of up to 15 tons. Yes, your business can realize important savings in time, money and manpower by applying the YALE PUL-LIFT to countless maintenance and construction operations. CALL YOUR LOCAL YALE INDUSTRIAL DISTRIBUTOR FOR COMPLETE INFORMATION . . . he's listed in the classified pages of your local phone directory under the heading Hoists, Industrial.

YALE is a registered trade mark of The Yale & Towne Mfg. Co.

The Yale & Towne Manufacturing Co., Phila. 15, Pa.

MAIL THIS COUPON TODAY

The YALE & TOWNE Mfg. Co., Dept. 310A

Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Pa.

I'm interested in lifting for less with a YALE Hoist.

☐ Please have your local Hoist Distributor call on me.

Please send detailed literature on:

☐ YALE Pul-Lifts. ☐ YALE Hand Hoists. ☐ YALE Electric Hoists.

Company_____

Name_____ Title_____

Street_____ City_____ State_____

In Canada write: Yale & Towne Mfg. Co., Box 887—Postal Sta. "A", Toronto

YALE
PUL-LIFTS

SOLD ONLY THROUGH INDUSTRIAL DISTRIBUTORS

Yale Gas and Electric Industrial Trucks • Yale Worksavers • Yale Hand Trucks • Yale Hand and Electric Hoists • Yale Pul-Lifts

LUFKIN DEPTH MIKES

FOR QUICK, SURE MEASUREMENTS

EASY TO READ:
Non-glare satin Chrome Clad finish on hub and thimble for easy reading even in poor light. Each thousandth numbered for rapid reading.

EASY TO LOCK:
Patented lock nut engages rod securely at any point to hold reading. Lock nut is placed away from thimble so it can be tightened without disturbing the measurement.

EASY TO HOLD:
Well balanced base has knurled top surface to give firm grip so essential to accurate measurement.

Lufkin Micrometer Depth Gages are the finest, most accurate, and easiest to use. Like all Lufkin precision tools, they are the product of years of fine tool making experience combined with the very latest design features. Advanced design features are: well-balanced hardened and ground base; adjusting nut on rods regulates length to compensate for wear; hardened and lapped rod ends; simple adjustment to obtain desired tension; rods are easy to change. All models available with ratchet stop. Packed in fitted mahogany box.

COMPLETE LINE OF LUFKIN MICROMETER DEPTH GAGES

513:	3-inch base. Range 0-3 inches.
513 0-6:	3-inch base. Range 0-6 inches.
515:	5-inch base. Range 0-3 inches.
515 0-6:	5-inch base. Range 0-6 inches.
212:	2-inch base. Range 0-3 inches.

BUY LUFKIN TAPES • RULES • PRECISION TOOLS FROM YOUR DISTRIBUTOR

197

THE LUFKIN RULE CO., SAGINAW, MICHIGAN
132-138 Lafayette St., New York City • Barrie, Ontario

If you have a

FACTORY PROBLEM

in production, assembly, packaging, shipping

You can save time and money with the proper use of

SEAMLESS F.O.S. INDUSTRIAL TAPE

For masking, holding, packaging, backing, hinging, protecting, reinforcing, identifying, splicing, sound-proofing, insulating, stenciling, bundling, sealing, binding

USE SEAMLESS F.O.S. *Industrial Tape*

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collect for authoritative advice and suggestions. Prices, catalogues, samples on request. Tape to meet govt. specifications. Wire details collect for 24-hour reply.

"Originators of Pressure-Sensitive Industrial Tape"

WIRE INDUSTRIAL TAPE DIV. A

THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN., U. S. A.

Does your plant measure its growth potential by the length of its electric cords?

1. CAN YOU PLACE LIGHTS, POWER TOOLS, MACHINES OR APPLIANCES WHERE THEY'RE NEEDED MOST or is their positioning inflexibly set by the length of their electric cords and the location of *fixed* outlets? Here, maintenance man Thomas George of Connecticut Manifold Company shows how easy it is to locate a lighting fixture *exactly* where it will do the most good, as he slips its plug into a run of LTG FLEX-A-POWER®, Trumbull's pre-fabricated trolley and plug-in busway that is *one continuous outlet.*

2. MODERN DISTRIBUTION SYSTEMS MUST BE FLEXIBLE, ready for future expansion or rearrangement of lighting fixtures or production tools. This installation includes almost 1000 feet of LTG FLEX-A-POWER leading to every part of 50,000 square feet of floor space. Fixtures and small electric tools can be easily moved along the busway or, should future changes demand it, busway sections can be easily dismantled and re-assembled into a new system.

3. WHOLE LINES OF TOOLS CAN BE RELOCATED or entire lighting systems rearranged with FLEX-A-POWER. Power tools as well as the lights in this machine shop get their power supply from the LTG line above. *Learn now how LTG FLEX-A-POWER can solve your low-voltage distribution problems.* It comes in two-, three-, or four-pole types rated at 50 amps, 300 volts a-c or d-c.

NO SHORTAGE—Your Trumbull distributor's supply of FLEX-A-POWER is backed by ample factory stocks to meet all your distribution needs.

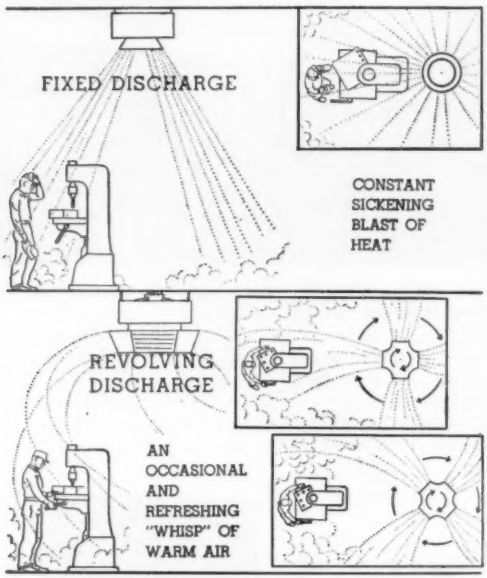
Write for circular TEC-3 on LTG FLEX-A-POWER. And remember, Trumbull has FLEX-A-POWER of other types to handle *all* your distribution needs.

Trumbull Assures LASTING FLEXIBILITY in Power Distribution

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

The BIG difference between "revolving" and "fixed" unit heaters . . . .



WING REVOLVING UNIT HEATERS are successfully solving the heating problems of thousands of industrial plants today because they assure a uniform comfortable temperature throughout, with no hot blasts, no cold spots, no chilly corners. Instead of annoying hot blasts, the worker is conscious only of a pleasing sensation of fresh, live, invigorating warmth . . . and in summer, with the steam turned off, the revolving "heaters" become an equally efficient cooling system. Write for a copy of Bulletin HR-6.

L. J. Wing Mfg. Co.
162 Vreeland Mills Road, Linden, N. J.
In Europe: Etab. WANSON, Haren-Nord, Brussels, Belgium
Factories: Linden, N. J. and Montreal, Canada

Wing REVOLVING UNIT HEATERS

Searchlight Can Help You!

HUNDREDS of miscellaneous business problems that confront you from time to time, can be quickly and easily solved through the use of the Searchlight Section of this or other McGraw-Hill publications.

The SEARCHLIGHT SECTION Classified Advertising **of McGraw-Hill Publications**

Can help you by bringing business needs of "opportunities" to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by:

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Bus Transportation
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Chemical Week
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Engineering News-Record
E. & M. J. Markets
Factory Management and Maintenance
Fleet Owner
Food Engineering
Nucleonics
Power
Product Engineering
Textile World
Welding Engineer

The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus equipment, want additional products to manufacture, seek additional capital, or have other miscellaneous business wants — advertise them in the Searchlight Section for quick profitable results!

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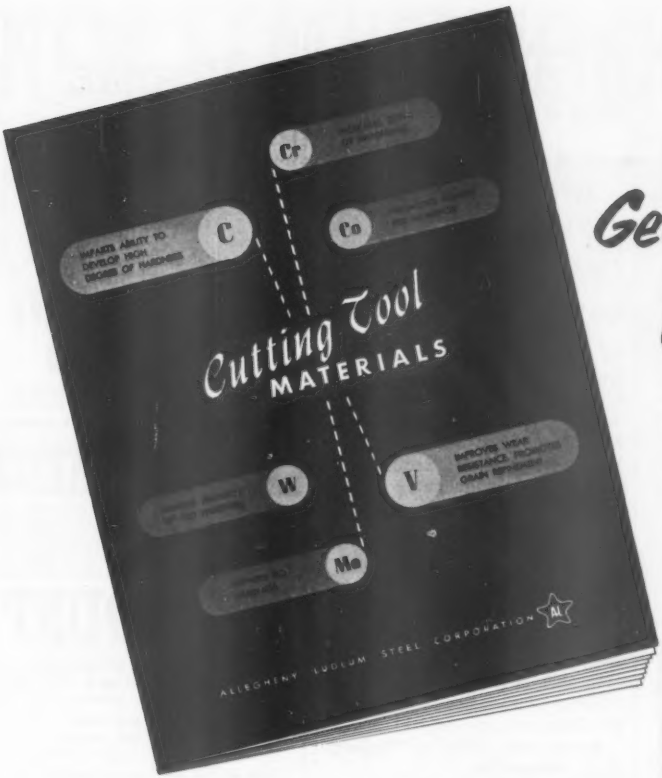

Get your copy...

WRITE FOR IT TODAY!

LOOK in this BOOKLET

when you're *puzzled about Tool Materials!*

A-L OFFERS YOU
Complete Service for Modern Tooling

By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8¼" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

ADDRESS DEPT. F-34

You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

"Should we use *Carbide* on this job? What grade?" . . . or, "How about tooling up with *Cast Alloy* for that other run?" . . . or, "Can we cut this extra-tough stock fast enough with our usual grade of *High Speed Steel?*"

This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete MODERN Tooling, call

Allegheny Ludlum

W&D 3703

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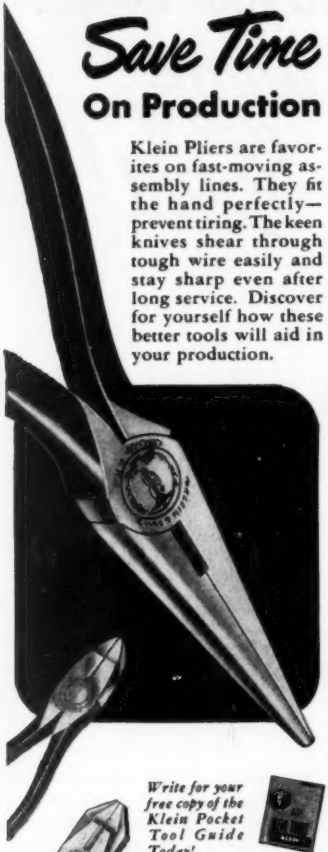
FINE TOOL STEELS
SINCE 1854

KLEINS

Save Time
On Production

Klein Pliers are favorites on fast-moving assembly lines. They fit the hand perfectly—prevent tiring. The keen knives shear through tough wire easily and stay sharp even after long service. Discover for yourself how these better tools will aid in your production.



Write for your free copy of the Klein Pocket Tool Guide Today!

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

"SINCE 1857"

Mathias Klein & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVE., CHICAGO 18, ILL.

MISCELLANEOUS EQUIPMENT

Begins on page 220

Mat Switches Give You a Versatile Control

With Recora Switchmats you can actuate machines, bells, alarms, doors, etc., from any point over an extended area by foot, hand, or vehicle.

Only 3/16-in. thick, they can be used on floors, platforms, stair treads, etc., without obstructing foot or vehicle traffic. Pressure on any part of the area covered by the mat closes the circuit; remove pressure, and circuit opens.

Standard Switchmats operate on a pre-determined pressure ranging from a few ounces to several tons.

You can get them in two standard sizes, 14x23 and 18x30 inches. Switchmats can be used directly in series in circuits drawing up to 100 watts—and on almost any electrical device drawing up to 1000 watts when used with standard Recora relay control boxes.

Recora Co., 7419 S. Western Ave., Chicago 36.

■

For Heavy Snow Clearing Jobs

The Sensation Sno-Blo Model ISB was made to tackle heavy snow around your loading dock, walk, and driveway areas.

It is powered by a 3½-hp. Kohler gasoline engine. It chews a 1½-ft. swath through heavy snow.

The snow may be blown to either side of the cleared area. Direction and control handles are within easy reach of the operator.

Available as an accessory is a 2½-ft. bulldozer blade that you can hook up for pushing snow that is too wet to be blown.

Sno-Blo propels itself on cast high-traction lug-wheels. Inside blower and bulldozer parts are finished with Duk-Kot rust-preventive coating.

Sensation Mower, Inc., 7577 Burlington Tr., Ralston, Neb.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catalog No. 41-0.
W. B. SKINNER CO., SOUTH BEND 21, INDIANA

STOP *that* WATER

With FORMULA NO. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt. Holds 50# head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick economical, sure. $6 in 55's. Free sample. See Sweet's
HAYNES PRODUCTS CO., OMAHA 8, NEBR.

STOP DUST

DUSTKOPS — UNIT TYPE, LOW COST — 22 Models — 300 cfm to 10,000 cfm, ¼ hp to 15 hp.

AVAILABLE FROM STOCK
For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS
Send for Cat. 685J; describe problem for recommendation by return mail, without obligation
AGET-DETROIT CO. • ANN ARBOR, MICH.

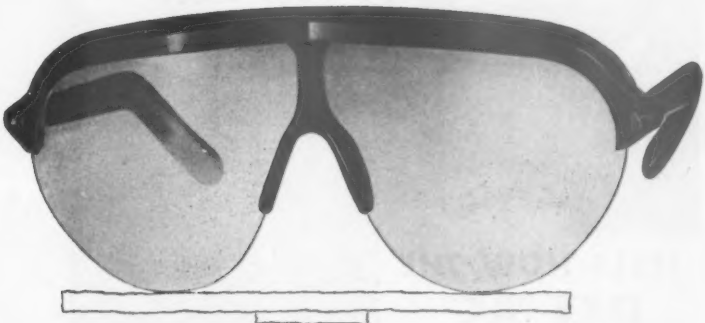
FLUX
for
SODERING
SILVER SODERING
WELDING
BRAZING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

CAN YOUR PRODUCT

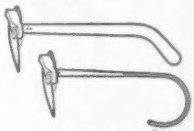
Cut costs, boost production or increase plant efficiency? If so, say so in this Where-to-Buy section. Then you'll have your prospective customers—the 54,800 paid subscribers to this plant operator's magazine — coming to you.

NEW FEATHERWEIGHT CHAMP



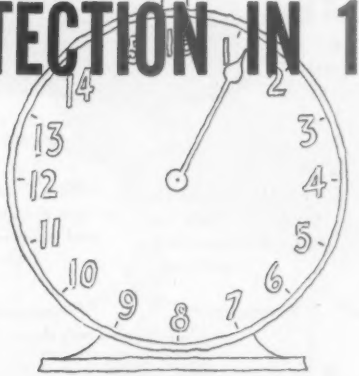
LOW-COST PROTECTION IN 1¼ OZ.!

One-piece curved impact-resistant acetate lens can be replaced in seconds. Interchange clear with transparent green. Can't be jarred loose. Reinforced bridge is integral part of frame, gives extra protection and comfort.



Ful-Vue temples, spatula or flexible cable styles, provide unrestricted wide-angle vision. Both styles with optical hinges.

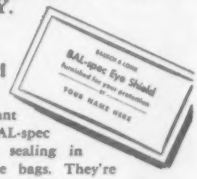
BAL-spec is unusually comfortable. May be worn effectively over regular glasses or corrective safety lenses.



Here's an all-acetate spectacle-type eye shield that meets a long expressed need. Especially suited for workers, supervisory personnel and plant visitors in semi-hazardous areas. BAL-spec weighs only an ounce and a quarter! It affords an unusually wide field of view. Frame is extra sturdy. Spatula temples especially desired by women because they don't muss hair. The one-piece acetate lens, of course, meets all U.S. Bureau of Standards requirements. Each BAL-spec individually sealed in cellophane. Ask your Bausch & Lomb supplier for descriptive literature, free sample to examine and test in your plant. Or write Bausch & Lomb Optical Company, 90110 Smith St., Rochester, N. Y.

PACKAGED FOR VISITORS!

You provide sanitary protection for plant visitors by cleaning BAL-spec and re-inserting and sealing in dustproof polyethylene bags. They're available plain or with your imprint.



The brand new Bausch & Lomb

BAL-spec

ALL-PLASTIC SPECTACLE-TYPE EYE SHIELD

This NEW Bulletin Will Help You Solve Your Dust Control Problems

TELLS HOW THE DAY "AC" DUST FILTER

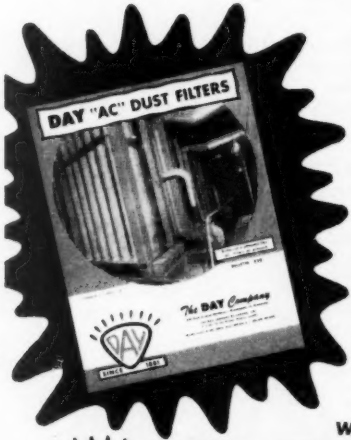
WILL FIT INTO YOUR OPERATION MORE EFFICIENTLY AND ECONOMICALLY

Licensed by H. J. Hersey, Jr.

Continuous-Automatic cleaning with never a shut-down for shaking or rapping

Filtering Efficiencies up to 99.998% on finest sub-micron dust particles

More Economy in space, installation and maintenance costs



We've circled only three of the outstanding advantages you get in a DAY "AC" Dust Filter . . . there are hundreds more. That's why we've compiled Bulletin No. 528 which will give you the complete story on the efficiency of this filter, including facts and figures on its outstanding performance in plants like your own. The bulletin also shows how DAY engineers can help you toward the solution of any dust problem peculiar to your industry.

We want you to have the complete story, and a request on your letterhead will bring it to you. Simply ask for Bulletin No. 528 which not only contains detailed information on DAY "AC" Dust Filters, but a Dust Problem Analysis Sheet for convenience in making a dust check in your plant, and information on other DAY air handling and air cleaning equipment.

Write for your FREE copy TODAY!

DAY SINCE 1881

The DAY Company

858 3rd Ave. N. E., Minneapolis 13, Minn.
IN CANADA: P. O. Box 70R, Ft. William, Ontario
Branch Plants in Ft. Worth, Buffalo and Welland, Ontario

WALKS • DRIVEWAYS • PLATFORMS

Cut snow removal from hours to minutes around your plant with this powerful, self-propelled Jari, Jr. Rotary Snow Plow for walks and driveways. It's self-propelled, and fast . . . clears 4500 sq. ft. and handles up to 18 tons of snow . . . per hour!

SPECIFICATIONS: 2-wheel drive, self-propelled with positive forward movement. Easy starting 1½ hp. gasoline engine, independent clutch. Clears a clean 16-inch path. Rotary rake chews hardened snow for easy removal. Adjustable casting chute. Weighs only 129 lbs. Extra attachments: 28" sickle bar or 20" reel for use as a power mower.

At your dealer or write to

jari PRODUCTS, INC.
2938M Pillsbury Ave., Minneapolis 8, Minn.

IT'S EASY FOR UTILITY MONEY TO "GO UP IN SMOKE"

(DOES YOURS?)

Are you positive that you are getting the lowest utility rates you deserve? Thousands of businesses are not. They have been paying too much for years, and don't even know it.

Before you say, "Not me," find out. It's so easy to have our "Rateonicians" make an analysis. It could mean refunds for past overcharges, and thousands of your own dollars saved in the future.

Write today to —

Rateonics Corporation

P. O. BOX 239 DALLAS, TEXAS
UTILITY RATE COUNSELLORS TO INDUSTRY

HEAVY LOADS AWAY!

one man moves up to 15 tons

It's *100%* easy handling of heavy loads with the Trav-Lift! No out-of-reach spots, no traffic-jam delays, no rehandling . . . *this way!* Lift, transport, lower and stack materials *anywhere* within an entire bay area. It's all done through the air, all by just *one* man.

That's why, when requirements call for cranes, P&H Trav-Lifts are first choice for fast handling. In the Trav-Lift, you get a custom-made crane at "stock" prices . . . because P&H uses standard money-saving designs . . . because P&H builds the entire unit, electrical equipment included.

You can have the Trav-Lift with cage or floor control . . . with various spans and lifting speeds and in capacities to 15 tons. It's another quality product of P&H . . . America's largest builder of overhead handling equipment. Your call to P&H will bring an expert anxious to help with your handling problems.

handle it "thru-the-air" at lower cost

P&H OVERHEAD CRANE DIVISION

HARNISCHFEGER CORPORATION

4400 West National Avenue, Milwaukee 46, Wisconsin

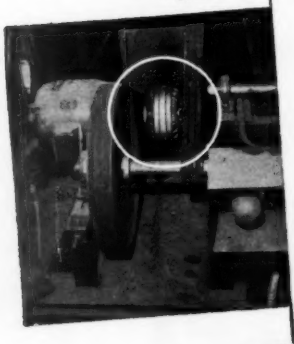
POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FABRICATED HOMES

Man Missing!
...but *NOT* missed

The man who used to operate the reversing wheel on the carriage which conveys structural steel to this Beatty Press is somewhere else. He's doing a *more necessary* job for the Robberson Steel Company of Oklahoma City, since that concern joined the thousands of industries which have solved motor and equipment damaging shock loads with Twin Disc's power cushioning HYDRO-SHEAVE® Drive.

Since the HYDRO-SHEAVE® was installed, the press operator also controls the return. He runs the carriage forward, then reverses the motor and brings the carriage back without danger of burning up the motor or tearing up the drive mechanism. Work cycles are speeded, too. And the 3 hp. Reversing Squirrel-Cage Motor does a bigger job than is possible without the HYDRO-SHEAVE®.

The HYDRO-SHEAVE® is one of the wide range of Twin Disc fluid and friction drives used throughout industry to apply productive power—and backed by the most thorough service available in the power field. Eight Factory Branches and 60 Parts Stations carry a constant inventory of $3¼ million of repair parts and replacement units. 67 Hydraulic Dealers stock and install Twin Disc Hydraulic Drives.



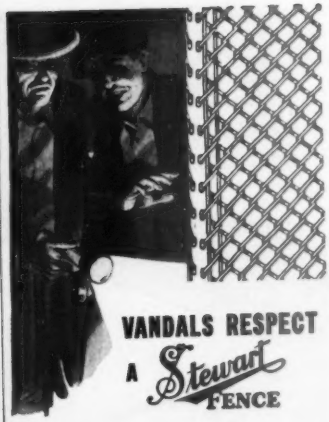
A complete conversion unit as easy to mount as a sheave. Twin Disc's HYDRO-SHEAVE® Drive, helps motors and engines from ¾ to 50 hp. do a bigger, faster, smoother job. Described in Bulletin 145-B.

Twin Disc HYDRO-SHEAVE® Drive

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

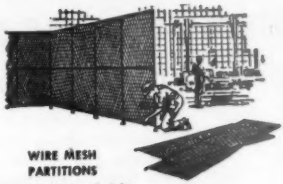
TWIN DISC CLUTCH COMPANY, Racine, Wisconsin · HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND · DALLAS · DETROIT · LOS ANGELES · NEWARK · NEW ORLEANS · SEATTLE · TULSA



VANDALS RESPECT A Stewart FENCE

Every foot of unfenced property lines, every unprotected door, every window within reach of the ground, and skylights, too . . . all are potential points of entry. So why risk a visit from vandals or saboteurs? Surround your property with a Stewart Chain Link Wire Fence, and install the other Stewart products, some of which are illustrated below, designed specifically for protection against unwarranted trespass. Taking these precautions may prove the best investment you ever made. Write for catalog No. 85.

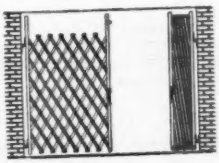


WIRE MESH PARTITIONS

Furnished any height or width. Easily and quickly erected. When writing for prices, please give all measurements involved.

WINDOW GUARDS (Wire or Iron)

Made with round or channel frames to fit any size or shape opening. When requesting prices, please give measurements and send diagrammatic sketch.



STEEL FOLDING GATES

Made in single or double gate construction to fit any width opening. Prices on request. Please give width and height of opening.

THE STEWART IRON WORKS CO., INC.
1956 Stewart Block Cincinnati 1, Ohio
Experts in Metal Fabrications Since 1866

Stewart IRON and WIRE FENCES

A Maintenance Chief shows why he prefers two-piece QD design

1. "WE'VE STANDARDIZED ON THEM" says this maintenance chief about the Worthington QD sheave. Yes, the millwrights in his plant prefer the two-piece design of the QD sheave with the exclusive features that permit holding the hub on the shaft in a predetermined position and provide for locking the key to prevent drifting. See how easy it is to install QD hubs and sheaves in the pictures below.

2. "IT'S THE LIGHT WEIGHT OF THE QD HUB THAT MAKES INSTALLATION EASY." Without sheave rim obstructions, that easy-to-handle QD hub can be fitted to *oversize* or *undersize* shafts using a wedge for oversize fits. The QD hub is held in a predetermined position on the shaft when the flange cap screw is tightened. Drifting of the key is prevented by tightening of a flange set screw—another exclusive feature with the Worthington QD. And, of course, the QD hub comes off as easily as it goes on.

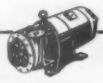
3. "HERE'S WHERE WE REALLY SAVE TIME AND TROUBLE." No juggling of a heavy rim and hub assembly to get it on a shaft with close-tolerance fits. The rim—with its large taper bore opening—slips easily over the small end of the taper QD hub—like threading a needle with a very *large* eye! A tight press-fit is assured as heavy pull-up bolts are tightened. There's no doubt about it—the friction-cone fit of the Worthington QD hub and rim grips the shaft tighter than any other sheave.

4. "ONCE ALIGNED, IT NEVER NEED BE RE-ALIGNED." That's a basic advantage with the QD, Mr. Maintenance Chief. Men like you know that the rim is easily removed using the heavy pull-up bolts as jack screws. If a speed change is called for, another size sheave can be slipped on the QD hub without disturbing alignment. If the QD hub is removed from the shaft for unit maintenance, it's easily positioned and held in place through the flange cap screw on re-assembly.

Worthington's complete line of Multi-V-Drives includes QD sheaves in all sizes, the QD juniors for fractional horsepower drives, and Worthington-Goodyear V-belts. *And you can get them fast!* Your distributor has a *complete* stock backed by the largest factory stocks you'll find anywhere. Send today for more information in Worthington Bulletin V-1400-B7F. Worthington Corporation, Multi-V-Drive Sales Division, Buffalo, N. Y.

MV.2.1

COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER

MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

ALLSPEED DRIVES: WORTHINGTON ALLSPEED

WORTHINGTON

Multi-V-Drives

Buy these Worthington standard products from your local distributor

KENNEDY

Fig. 544P

JOB-FITTED

for longer disc and seat life... where accurate control is a must

Like all valves in the complete KENNEDY line these bronze globe valves are JOB-FITTED . . . specially designed and engineered for the job they have to do!

UNION BONNET RING, heavy bronze section with extra thread engagement to assure a tight joint. Union bonnet makes a valve easy to dismantle and reassemble.

STEM, Naval Brass Rod, Acme threads, large diameter with extra thread contact . . . extremely resistant to wear.

PACKING, molded rings of graphited, wire-inserted asbestos designed for high pressure service.

PLUG TYPE DISC, nickel copper alloy, has extra wide seating surfaces for precise throttling control . . . is exceptionally resistant to scouring or wire drawing.

RENEWABLE SEAT RING, nickel copper alloy, ground to match disc in each valve to assure full bearing surfaces over entire contact area of each.

KENNEDY Fig. 544P, plug type disc, and Fig. 544, full-way disc, are designed for 300 lbs. steam, 600 lbs. WOG. Fig. 138P, plug type, and Fig. 138, full-way disc, for 200 lbs. steam, 400 lbs. WOG.

WRITE FOR BULLETIN 108

THE **KENNEDY**
VALVE MFG. CO. • ELMIRA, N.Y.
Est. 1877

VALVES • PIPE FITTINGS • FIRE HYDRANTS

floor splintering stopped!

Business can't run smoothly on rough floors. Materials handling is especially tough—unless the floor has been especially toughened, as this one was, in the immaculate plant of Wildroot, Inc., Buffalo, N. Y.

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. . . gained by solving floor problems for a quarter century, makes effective results possible at low cost. Tremco Man J. P. Hurd planned this economical floor saving program. There is a Tremco Man like him near you—and there is no obligation for his inspection and advice.

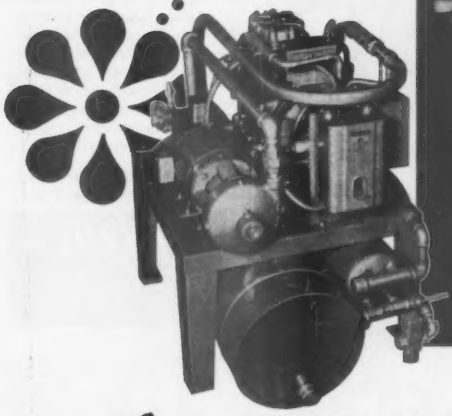
Inspection, by Tremco Man Hurd, showed that impact and scuffing of heavy drums caused severe dusting and splintering. He recommended "mechanical hardening" and sealing of the wood surface with Penetrem to obtain a smooth, durable, easy to clean floor. Tremco methods keep Wildroot's floors—both concrete and wood—smoother, harder, easier to clean. For your copy of "Industrial Floor Maintenance," write The Tremco Manufacturing Co., Cleveland, Ohio or The Tremco Manufacturing Co. (Canada) Ltd., Toronto.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

UM-1023

increase honing efficiency and profits



with Acme FLOW COLD® Packaged Liquid Chiller

PROBLEM

THE REO MOTOR COMPANY in Lansing, Michigan had two honing machines that were not operating at peak efficiency because the oil used in the coolant process picked up large amounts of heat during the honing operation. The result was low production and a large number of rejects. Extremely limited space made the installation of the usual industrial chilling unit impossible.

PLAN

Acme engineers recommended the installation of a 15-horsepower Flow-Cold Liquid Chiller. This unit with a cooling capacity of 40 gallons per minute in reducing the coolant used from 90 to 70 degrees, met minimum space requirements. Mounting the pump of the chiller on the floor and the liquid chiller overhead allowed the pumps of the honing machine to remain in the same position where they could continue to service the machine when the chilling unit was shut down.

PROFITS

An immediate increase in production capacity and a decrease in the number of rejects was evidenced as the heat was dissipated during the chilling process and the coolant returned to the honing machines at a constant temperature. The compact packaged Flow-Cold serviced the two honing machines with maximum efficiency and performance.

Since this installation was made Reo has added two more Flow-Cold "packaged" units — one for a broaching machine and the other for a quench-bath cooling process.

ACME PRODUCTS

ACME INDUSTRIES, INC., JACKSON, MICHIGAN, U.S.A.

Flow Cold Division

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For maximum "see-ability"...
better work...increased production...

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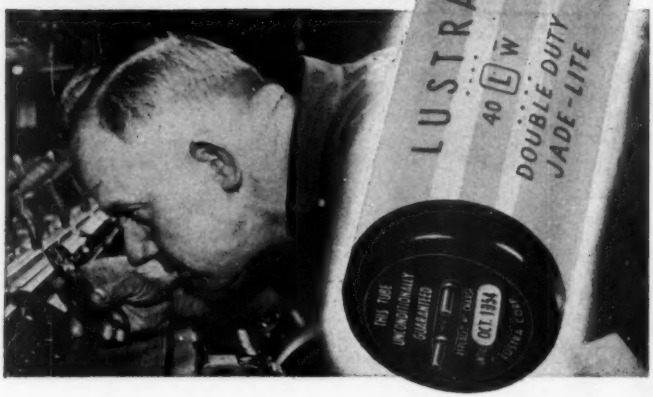

HERE'S THE ONE AND ONLY fluorescent tube that has ever been designed for super-service in critical work areas. Lustra Jade-Lite gives a special quality of light that steps up "see-ability". In addition, its unique tone, in the blue-green spectral range, reduces glare, helps eliminate eye-strain, and results in a better quality of work and increased production.

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Have your local Lustra Man demonstrate the amazing efficiency of the new Jade-Lite tube under your actual working conditions. What's more, he can solve practically any lighting problem with the complete line of Lustra *Double Duty* Lamps, Fluorescent Tubes and allied electrical products. Write us and we'll have him arrange for an appointment. **Lustra Corporation, Dept. T-10, 36 Washington St., Brooklyn 1, N. Y.**

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N-36 medium weight all neoprene glove, 11" length. Snug curved fingers, non-slip grip surface afford almost bare-hand dexterity.

Long-wearing liquid-tight neoprene Stanzoil industrial gloves resist damage from acids, oils, solvents, caustics. 32 styles, weights, sizes, colors. New PIONEER catalog shows you *at a glance* how to select the most efficient and economical gloves for each operation. It pays you to write for your copy today.

Industrial Products Division
The PIONEER Rubber Company
622 Tiffin Road • Willard, Ohio

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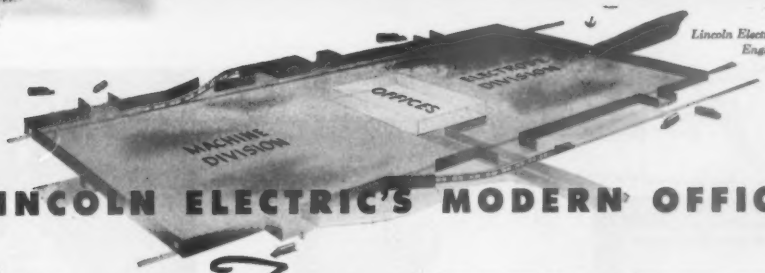

Lincoln Electric Company, Cleveland, Ohio
Engineers and Builders:
The Austin Company.

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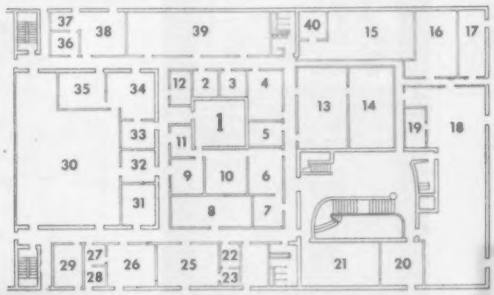
Efficiency First

has been made lasting with

MILLS *Movable* **WALLS**



Office Layout

Lincoln Electric Company's new 20-acre plant is designed for maximum efficiency in every area, for office as well as production operations. All offices are located in the center of the factory building, with the president's office, *No. 1 in floor plan and pictured at left*, in the exact center of everything, surrounded by key personnel.

Future efficiency is assured by subdividing all office space with Mills Movable Metal Walls. As progress creates changes in space requirements Mills Walls can be moved to fit new layouts—in a matter of hours, with minimum labor, at very low cost and without interrupting normal routine.

Mills Walls combine mobility with distinctively modern and attractive appearance. Insulated and soundproofed, they require no maintenance but occasional washing to keep them looking fresh and bright.

★ ★ ★

Your office space can be made more efficient by *mobilizing* it, through *flexible* interiors formed by Mills Movable Metal Walls. For complete information on this modern, efficient way to subdivide interior space write for this easy-to-read, 48-page booklet, Mills Catalog No. 51.

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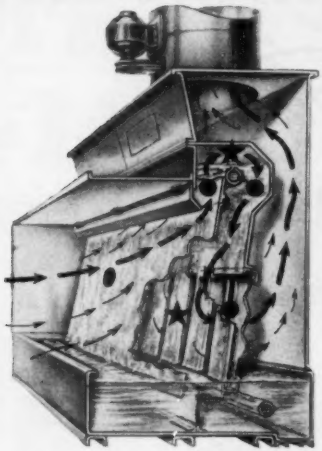
industrial spray finishing equipment

engineered to your requirements

A NEW COMBINATION OF IMPINGEMENT AND SCRUBBING
★ Impingement principle, through sudden changes in direction of air flow, throws pigment against booth's washed surfaces.
● Scrubbing principle flushes out most of the pigment because water drops adhere to the paint particles.



NEW spray booth design introduces fresh concept to save space, speed cleaning

Binks NEW Dynaprecipitor Spray Booth adds a new twist to old engineering principles for removing pigment from air.

First, the booth employs the time-proved scrubbing method to wash out most of the suspended paint particles. This occurs at points marked ● in illustration above.

Then, the new twist. Through sudden, violent changes in direction of air flow, the booth uses centrifugal force to fling the remaining paint particles onto its washed surfaces. This occurs at points marked ★ in illustration above. Water then flushes the particles into a collection pan where they are trapped for reclamation or removal.

Other new features of this booth: collection pan is 9" narrower—baffle plates and major water curtain can be quickly removed without tools for easier, faster maintenance and inspection.

The net results are improved protection against atmospheric pollution, less floor space used, and far easier cleaning.

Get your free copy of Bulletin DUC

Lists 7 major improvements Binks NEW Dynaprecipitor can make in your finishing department... fully illustrates new design twists in this booth. See your nearest Binks industrial distributor for a free copy or write to: Binks Manufacturing Company,

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AN OFFICE LIGHTING SYSTEM
WHICH PROVIDES A HIGH LEVEL OF VISUAL COMFORT?

— BUT AT **L.O.C.**

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NOTE THESE FACTS ABOUT L. O. C.

INSTALLATION COST: LOW — simplified by sliding clamp hanger mounting.

MAINTENANCE COST: LOW — only one ladder position needed for relamping — only ETL Certified ballasts used.

LONG, USEFUL LIFE: assured by sturdy Miller QUALITY construction — rigid "T" cross-section channel — extremely strong louver assembly, with cross baffles and side rails of one-piece steel, interlocked with center baffle and end plates.

FINISH — 89% reflection factor. Hot sprayed high-bake white enamel over steel rust-protected by 5-stage Bonderite process.

IDEAL office lighting — at L. O. C.

WRITE FOR FULL DETAILS ABOUT MILLER LEXINGTON

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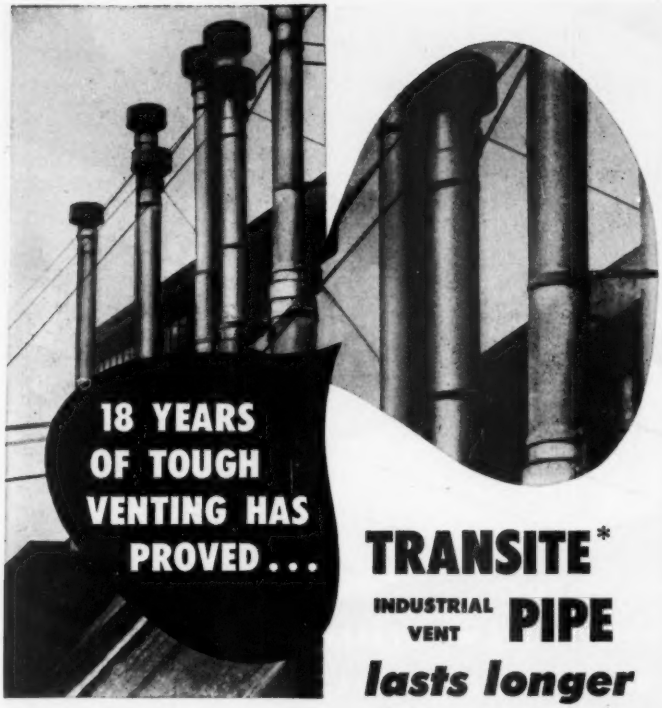

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Transite Industrial Vent Pipe is known to many users for its exceptionally long service life. In lines where aggressive gases, fumes and vapors are present, it has proved itself time and time again. Maximum corrosion resistance is imparted to asbestos, cement and silica during manufacture which includes a special Johns-Manville steam curing process. Transite has paid for itself, sometimes over and over again, on many installations.

In addition, Transite Industrial Vent Pipe cannot rust. It needs no painting or other protective treatment. It has been used as ducts, vents or stacks for 15 to 20 years and longer . . . remaining in excellent condition . . . outlasting other material by a wide margin. (Transite has served the factory shown above for 18 years.)

Transite is light in weight and easy to handle. It can be cut and drilled with ordinary tools. It comes in a complete range of sizes up to 36" in diameter. A full line of corrosion-resistant Transite fittings makes it adaptable to practically any job requirement.

For further details on Transite Pipe for your venting problems, simply fill out and mail the coupon to Johns-Manville, Box 60, New York 16, N. Y. In Canada: 199 Bay Street, Toronto 1, Ontario.

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A Message to Capable Men Who Are Still Earning Under $10,000

Here Are Some Surprising Facts about the Great Demand for High-Salaried Executives Today — and What You Can Do to "Break Into" the $12,000 to $20,000 Bracket

AMAZING as it may seem, a serious shortage of high-salaried executives exists in every branch of business and industry today. You don't have to look further than the want-ad columns to know that the really big jobs go begging. Openings exist right now for high-calibre executives who can command a salary of $12,000 . . . $15,000 . . . $20,000—and more.

WHY the Big Jobs Go Begging

Employers are on the constant look-out for well-rounded men who show a potential for handling the big jobs. They're eager to invest in men who know the methods used by others to increase profits—men who can make money for them!

Such men are becoming hard to find. WHY? The acute shortage has been variously explained by the war years, the rapid expansion of industry, the tendency to specialize. The important thing is not why the shortage exists but WHAT you can do about it, and HOW you can qualify for the great opportunities that exist in business today.

As one of the foremost business consultants in the U. S. and the head of a large accounting firm, J. K. Lasser works with some of the nation's leading corporations. He has seen at first hand the scarcity of qualified men for high-salaried jobs. Why, Mr. Lasser asked, are there so many openings at the top—and so many men stymied in the $5,000 to $10,000 a year bracket?

The One Ingredient That Qualifies You for a Top-Salary Job

To find the answer, Mr. Lasser went directly to the heads of companies in many fields. Consistently he heard the same answer: the one thing men in the middle brackets need to make the high-salary grade is—a general, well-rounded knowledge of business procedure. "Give me a man with a basic knowledge of accounting, marketing, employee relations and taxation," one employer remarked, "and I'll lead him by the hand to a $20,000 office!"

J. K. LASSER

Featured in FORTUNE MAGAZINE as one of the nation's foremost authorities on business and taxes. Mr. Lasser is head of one of the largest accounting firms in the United States and Adjunct Professor and Chairman of the Institute on Federal Taxation at New York University.

This simple answer gave Mr. Lasser an idea for a brand-new plan that would literally lead men out of the $5,000-$10,000 plateau and into the top jobs. He asked the foremost men in every field to reveal working methods that have brought success in marketing, public relations, accounting, budgeting, insurance, government regulations, taxation, and the "know-how" in every business procedure for top-level management.

Mr. Lasser consulted only top men, such as business analyst Roy A. Foulke, Vice President, Dun and Bradstreet; marketing expert Marion Harper, Sr.; twenty executives nationally known for their successful methods. Then he simplified and "boiled down" this wealth of knowledge and experience into J. K. Lasser's Executive Course in Profitable Business Management—providing the all-important ingredient needed to boost men into the $10,000-plus bracket!

What You Can Learn from These Successful Executives

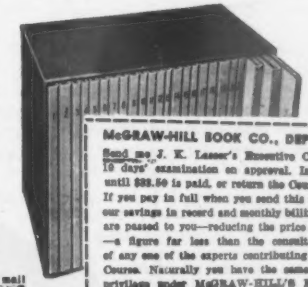
Lasser's Executive Course makes it possible for you to view each departmental operation from the top down, with an expert as your guide. You learn to talk, think, and plan with the kind of well-rounded authority expected of top-management.

You learn streamlined methods of distribution; how to run a cost system; how to design systems for internal control of business. Even hardboiled employers will be impressed by your knowledge of controlling operations through budgeting; how to avoid business frauds; and how to cut paper work in half. Your knowledge of new marketing methods, successful tax planning, and effective management under today's government controls can save and make money for any employer.

Are You READY for Advancement?

If you're not *sure* of your own advancement, send for Lasser's Course right away. By looking at the whole Course—noting the ground covered, the fact-filled treatment, Lasser's clear, informative style—you can quickly see how this Course can prepare *you* for advancement—back you up with the best ideas of 21 leading business experts.

Take the simple step of dropping the coupon in the mail today. No money down—no salesman will call—you merely agree to send your first installment or return the books, in 10 days. Send the coupon now—it may turn out to be one of the most advantageous steps you ever took.



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"How to Fight Electrical Fires"

"Conveyor Installation at a Small Shop"

"Supervisory Training at Cities Service"

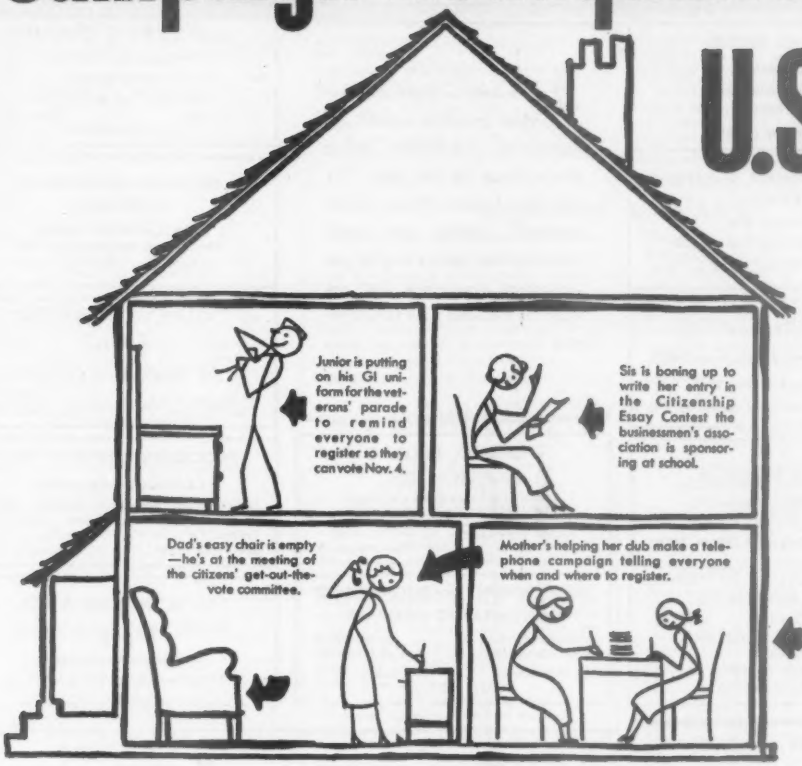
in

FACTORY MANAGEMENT and MAINTENANCE

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

F68

Campaign Headquarters U.S.A.


Junior is putting on his GI uniform for the veterans' parade to remind everyone to register so they can vote Nov. 4.
Sis is boning up to write her entry in the Citizenship Essay Contest the businessmen's association is sponsoring at school.
Dad's easy chair is empty —he's at the meeting of the citizens' get-out-the-vote committee.
Mother's helping her club make a telephone campaign telling everyone when and where to register.
Grandma's sending registration reminders to all the church members. Even little Sis is helping—rubber-stamping messages on the cards.

The Family Vote will elect the Next President

NOT THE FARM VOTE...
THE BIG-CITY VOTE...
THE LABOR VOTE...
OR ANY PARTY VOTE...

Politicians talk a lot about this and that "bloc" of voters being decisive factors in this election. So do all the pollsters. You can't blame them for trying to dope it out that way in advance . . . but . . .

YOU know you're going to vote your own sweet way when you get behind that voting booth curtain—that where you live or work hasn't got a blankety-bloc thing to do with how you'll vote. You'll vote for what you believe to be in the best interests of your family—your kids—and your kids' kids.

So YOU know that this year—as always—it will be the FAMILY vote that really decides things. And families are working as never before to make sure every American votes. Right now in millions of American families, everyone from Little Sis to Grandma is pitching in to remind every eligible American to register to make sure of the opportunity to vote. And then they'll tackle the job of getting out the vote of every member of America's 44,000,000 families. They're the biggest "bloc" in America—they ARE America!

If your family is already working at the job—congratulations! If you aren't, talk it over at supper tonight, and pitch in tomorrow.

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MATERIALS HANDLING
ENGINEERS
Over 20 Years Experience
Greenwich, Connecticut

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ALLAN H. MOGENSEN
Director
Work Simplification Conferences
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CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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FACTORY MANAGER for moderate size Upstate New York food manufacturer. Must have food, chemistry, supervisory and industrial engineering experience. 30-40 years of age. State education, experience and salary requirements. Confidential. P-5512, Factory Management & Maintenance.

EMPLOYMENT SERVICE

EXECUTIVES—CONTEMPLATING a change? Your personal requirements met thru our flexible procedures, affording full protection of your present position. We have the know-how and the nationwide contacts to negotiate successfully for you. Details on request, mailed under confidential cover. Jepson Executive Service (Est. 1939), 1040 Porter Bldg., Kansas City 2, Mo.

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Boards with U.C.E.Z. transparent watch holders. Stop watches. Pedometers, Slide Rules. Time study forms in stock. Sample kit free. Ozmun Products Co., 5544 So. Homan Ave., Chicago 29.

SALARIED POSITIONS $3,500 — $35,000
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(Inquiries from Employers entail no obligation)
THE NATIONAL BUSINESS BOURSE
29 W. Jackson Blvd., Chicago 4

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HARRISON PERSONNEL SERVICE
29 W. Jackson Blvd. — Chicago 4

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Salary commensurate with experience for aggressive, dynamic, congenial man with vision and proven executive ability. Our executives are informed. Write giving full details regarding age, family status, education, experience and salary requirements. Detailed job specifications available on request. Applications confidential.

P-5323, FACTORY MANAGEMENT & MAINTENANCE
520 N. MICHIGAN AVENUE CHICAGO 11, ILLINOIS

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Write Direct To
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23 W. Pleasant, Springfield, Ohio

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ON ALL
PERSONNEL PROBLEMS
To EMPLOYER and EMPLOYEE
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ENGINEERING—(All Phases)
ADMINISTRATIVE—ACCOUNTING
SALES—ADVERTISING
In Salary Brackets
$5,200—$50,000
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Suite 500 7 W. Madison St.
Chicago 2, Ill. Financial 6-2100

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120	70	IR	310	IR
122	100	IR	800	Worth
136	125	IR	1633	CP-PA
168	135	IR	1987	Worth
173	100	IR	*High Pressure Units*	
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One Year Guarantee.

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"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

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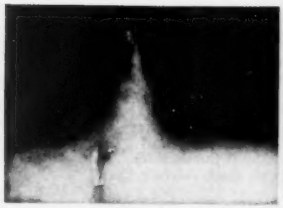
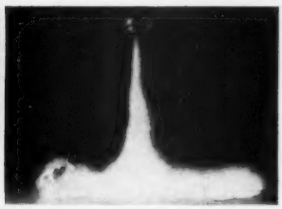
See how TRANE Unit Heaters deliver heat where it's wanted...



Throws heat without diffuser



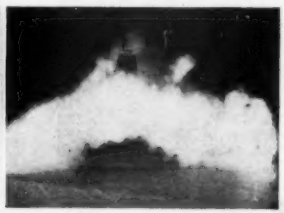
With louver cone: 60% extra throw

Forces heat to wide area

"Spots" heat to one side

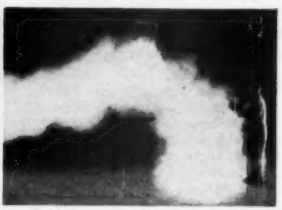
Patented Louver Cone on TRANE Projection Heater concentrates hot air stream for additional throw. Diffuses heat gently, directs it where needed, pinpoints cold spots—all with finger tip control. It taps waste ceiling heat, projects it down to floor line. Ideal for craneways, aisles, bays, and hundreds of other hard-to-heat places.

Diffuses heat in blanket

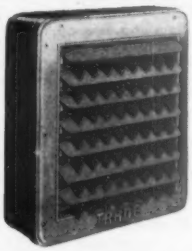


Split stream does double duty

Up to 25% more throw



Half flow ahead, half at angle



Patented Louver Fin Diffuser gives new versatility to the TRANE Model H horizontal discharge unit heater. Countless diffusion patterns are now available—divided streams, gentle blanket, spot throw. TRANE also makes the Torridor, a blower unit for large volume heating; deluxe cabinet units and new, improved gas fired units. All in a complete range of capacities.

TRANE Bucket and Float Traps—Matched for perfect service with TRANE Unit Heaters; high or low pressure.

For complete information about how TRANE Unit Heaters and Diffusers can solve your heating problems, see your nearest TRANE sales office or write TRANE, La Crosse, Wisconsin.

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

TRANE

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd. . . Toronto
Offices in 80 U.S. and 14 Canadian Cities

3 LINES OF SAFETY SWITCHES *for* 3 DIFFERENT MARKETS

. . . one line can't do two or three jobs without compromising price and performance!

GENERAL PURPOSE

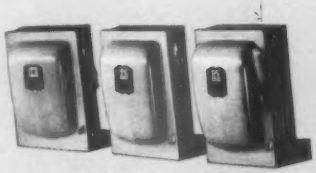
90,000 line designed for residential, commercial and other applications where price is limiting and the service factor is not great.

INDUSTRIAL

40,000 line designed for general industrial or institutional and commercial applications where the service factor is greater and price is an important consideration. MEETS BOTH GOVERNMENT AND NEMA SPECIFICATIONS FOR TYPE A SWITCHES.

HEAVY-DUTY INDUSTRIAL

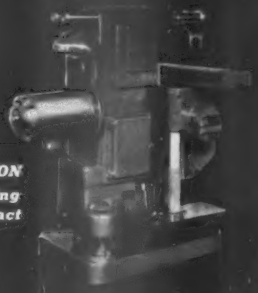
80,000 and 50,000 line designed for mass production industries where price is secondary to continued performance under conditions of severe service and maximum safety. The 50,000 line is used where space is limited. BOTH ARE TYPE A but go far beyond those requirements.



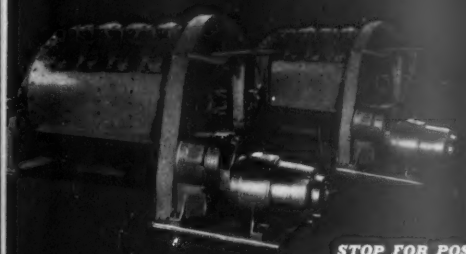
UNIFORM STYLING

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY



SPEED UP PRODUCTION
Save time by stopping quickly with a compact integral brake unit

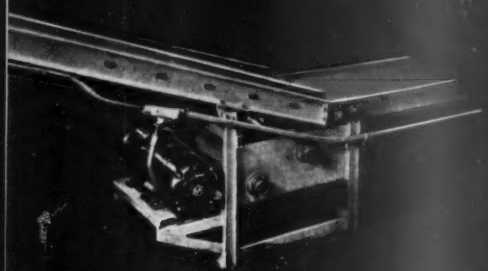


STOP FOR POSITION
Stop at the desired point for quickly and conveniently loading and unloading

MASTER UNIBRAKE MOTORS

1/8 TO 125 HORSEPOWER

THE MASTER ELECTRIC COMPANY • DAYTON, OHIO



STOP FOR SAFETY
Reduce the hazard of injury to workmen or damage to equipment which might cripple vital production

STOP AND HOLD ANY LOAD
Unibrake motors are very advantageous on hoist, elevators, inclined conveyors, etc. . . .